THE AMERICAN LARYNGOLOGICAL RHINOLOGICAL AND OTOLOGICAL SOCIETY
AWARDED
TO
DR. SAMUEL J. KOPETZKY
JUNE 1ST 1912
FOR
ORIGINAL WORK

TRANSACTIONS

OF THE

NINETEENTH ANNUAL MEETING

OF THE

AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY

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TRANSACTIONS

OF THE

NINETEENTH ANNUAL MEETING

OF THE

AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY,

Held in Washington, D. C., May 8, 9 and 10, 1913.

OPENING REMARKS BY THE PRESIDENT.

H. HOLBROOK CURTIS, M. D.

Members of the Laryngological, Rhinological and Otological Society:

It gives me great pleasure to welcome you to this our nineteenth annual meeting; and when the faces of those in the audience comprise with but few losses the handful of men who in 1893 conceived the idea, that has developed into the acknowledged factor our Society has become, I am more than impressed with the fact, that it was due to the initial enthusiasm and perseverance of those men, increased not diminished by time, which has today placed us in the first rank of allied associations.

The enormous advances in all branches of research, bacteriology, biology, psychiatry, preventive medicine, etc., as well as the sociological progress which has taken place in the last two decades, have added to our labors. We have kept abreast of the times. It seems however, that we have gone further than that, for the educational work done in our speciality has enabled social workers to perceive the great necessity of free respiratory passages in the physical and intellectual development of children. The relationship between aural defects and respiratory impedimenta is no longer a debatable question; but many of us can remember the time when in the New York Academy of Medicine it was the subject of discussion, as to whether the treatment of aural defects did not more properly belong to the ophthalmologist than the rhinologist.

Today we are entering into a new phase of economic evolution. The same progressive metamorphosis is invading medicine, as is changing both political and financial methods. Municipalities are waking up to the necessity of the erection and supervision of hospitals. The National Association for the Study and Prevention of Tuberculosis now here assembled in its annual meeting, is formulating advanced methods for national control of the disease. Sanitation and preventive medicine are exerting their influence on therapeutics. An appreciation of our obligations toward the betterment of the race, are evidenced by an open method of attack against vice, instituted by that wonderful woman of Chicago—Jane Addams. The responsibilities of the employer in regard to a living wage for young women, mothers and widows, as well as the revived attention to child labor, are occupying the State Legislatures. Pure food laws are being obtained by universal demand, and pure drugs by the action of our great medical bodies. But the progressive movement is intimately connected with ourselves as medical men, and we must never forget our obligations to our Maker and to mankind. A great tendency of the present day is to judge the character of a man by the current of public opinion, as obtained either through the press, or the circulation of libelous reports by his rivals and traducers. I wish to pay a passing tribute to that great financier, Mr. Morgan, to whose friends he was a great big charitable hero; in whose heart was no guile. His reputation he never stooped to vindicate, even when the yellow journals and his enemies used every method to besmirch the character of this notable chief. He was a large giver to our hospitals and a larger contributor to their maintenance. His death only has revealed to many the true qualities of his modest and lovable nature.

I feel that the special success of our Society is, that it has been founded on the principles of brotherly love. We have not let jealousies or private misunderstandings be prejudiced to the election of a single man, who by his attainments and character was adjudged by our Council to be deserving of the honor of fellowship. Our banner was hoisted in 1894 with the resolution that,—"eligibility to membership be extended to all who are worthy, without respect to number"; and so may it ever be.

It is not in my province to review the work our Society has accomplished, for its transactions chronicle the conscientious labors of the members and redound also to the credit of our publication committee, which should receive our warmest thanks and

encouragement. No doubt but few of us realize how arduous is the labor of editing thirty essays. The work done by our sections has been of special importance. It was my pleasure to be present at the winter meetings of the Middle and Eastern Sections, where the sessions were not only largely attended by our own members but very generously by the profession at large. The proceedings were conducted with great dignity and the scientific value of the papers presented was unusual. Let me turn for a moment to the synthetical rather than the analytical. What shall we do to keep up the standard of our good work? Shall we combine with our meetings more, or less, of the social elements? Do they not become a hardship to some men.—the entertainments, the elaborate dinners and luncheons, the ladies' excursions, etc.? Would it not be well to pay more attention to the glee club and the speaking at the annual dinner and not so much to the *menu?* Would it be possible to put most of the burden on our treasury and thus relieve the personal equation? These are suggestions it would be advisable to inquire into. The custom of inviting foreigners of distinction to make addresses is perhaps debatable and might be curtailed. Unless we have occasion to show especial honor to one who has performed some distinctive service for the benefit of mankind, in the discovery of some important surgical or bacteriological work, it would be lessening our own dignity to unduly emphasize this custom. It has always been a desire of mine that a committee should be appointed by the Council, to determine from the data presented to it, the priority of claims to certain instruments and operative procedures, for these are the monuments we leave to posterity, and it would seem that the originator of an instrument or operation should in all fairness be entitled to the credit of his ingenuity and efficiency. In no way can this question be adjudicated except through the agency of an authoritative body.

Forgive me if I have been trite in these few introductory words, but our future progress is very close to my heart. Finally I wish to thank all and every one of you, who have given me the greatest honor of my life: that of being President of this Society.

I now hereby formally declare the nineteenth Annual Meeting of the American Laryngological, Rhinological and Otological Society open for the transaction of business.

PRESENTATION BY THE PRESIDENT OF THE SOCIETY GOLD MEDAL FOR ORIGINAL RESEARCH WORK AWARDED IN 1912 TO SAMUEL J. KOPETZKY, M. D.

Doctor Kopetzky, in this country, where there exists but few opportunities for the material recognition of scientific achievement, it becomes especially pleasing to be able to make an exception in bestowing upon you a medal offered by this society of your colleagues, in recognition of your original research in the field of meningeal inflammations. I would suggest that not only do we honor you, but we feel reciprocally honored by the contemplation that an essay of so excellent a type, on such a complex subject as meningitis, should be compiled by one of our members.

The standing of a national society is shown by the efforts of its members in the line of scientific investigation, and when that investigation partakes of the nature of original research, it is especially to be lauded. Owing to the strenuousness of a busy specialist's work, many sacrifices have to be made in order to find time to devote to the tedious experiments necessary to verify all the premises which lead to definite conclusions.

I happen to be personally aware of the time you spent unselfishly upon the investigations which led you to receive this medal, and I present it to you in behalf of the Trilogical Society with my heartiest congratulations.

Dr. Kopetzky, in accepting the medal said: "I know of nothing more stimulating than the recognition of one's work by one's colleagues and peers.

"I have endeavored, and do endeavor, to maintain the same impersonal attitude toward my own work which I maintain with reference to the work of others. For this reason I have no inflated idea of the value of the work for which this medal is given. I simply believe that I have been enabled to glimpse along the right path. I trust that as time goes on, reports from other observers will be presented, and even adverse reports will begin to come in. The more reports we study, the more we are restrained from

over-enthusiasm, and thus preserve our impersonal scientific attitude. For myself, I may add, that once convinced that the results which I obtained in my study of the many-sided problems connected with meningitis are in error, then I want to be among the first to tear down what I have labored to establish.

"I am continuing these investigations, and I hope others will be stimulated to take up the study of the problems of meningitis.

"I shall always prize this medal as one of the most precious things which my professional life gave to me.

"I thank you."

REPORT OF THE COMMITTEE APPOINTED TO CONSIDER THE BEST METHODS TO BE FOLLOWED IN THE TEACHING OF OTO-LARYNGOLOGY IN UNDERGRADUATE AND POST-GRADUATE SCHOOLS.

The subject assigned to our deliberation naturally divides itself into two distinct parts, and yet in the final analysis, the post-graduate teaching is closely dependent upon the thoroughness of the undergraduate work.

First: "The Teaching of Oto-Laryngology to Undergraduates."

In order to ascertain what methods are followed and what views are held in the various leading universities of this continent upon this question, your committee submitted a series of questions to the professors of oto-laryngology in forty of the leading institutions, the list of these being compiled from the Carnegie Foundation Bulletin No. 4, entitled, "Medical Education in the United States and Canada."

These questions were as follows:

"1. Should the "Course of Instruction" be extended over one or two years?

2. How many hours should be devoted to this "Course of Instruction?"

3. What proportion should be clinical and what didactic?

4. In what order should these be given?

5. What should be the limits of such a "Course of Instruction", having in view the necessities of the general practitioner, and the proper balance of the subjects of a medical curriculum?

6. Should "Operations" form part of such a "Course of Instruction."

7. Should a separate examination in oto-laryngology form an integral part of the final examination?

N. B. In answering the above questions, which are intended to ascertain the personal views of those responsible of oto-laryngology in the leading medical colleges of the United States and Canada, it is desirable to indicate briefly also to what extent these personal views are carried out in the institutions with which the writer is connected."

Replies were obtained from some thirty-one institutions, including over twenty states and provinces, so that the opinion elicited may be considered fairly representative. In perusing these reports, your committee was agreeably surprised to find so little divergence in either practice or opinion as the replies revealed, and have therefore the greater confidence in submitting the resolutions which form their conclusions.

We regret that we were unable to elicit satisfactory information as to the amount of "individual instruction" given to each student. Where the number in the classes are considerable, (and if possible that number should never exceed six students), as Mygind (a) points out, "the student is apt to acquire superficiality in the examination of the patient," this fault is undoubtedly in many cases due to the teacher not having sufficient time to take each pupil individually and teach him all the details he should observe.

We note also that the idea still lingers in the minds of some of our leading instructors, that didactic lectures form an adequate means of instruction. About one-fourth of those reporting asked for equality between didactic and clinical instruction. Surely this can not be right. The regions involved in oto-laryngology are such as lend themselves least readily to demonstration by lectures, or even by lecture-clinics. It is only in so far as the student receives "individual instruction" on the living subject, that he can acquire an adequate knowledge of his subject in the limited time, which can be spared in the overcrowded medical curriculum.

This "individual instruction" requires time, patience and competent assistants, but these are well worth the expense involved, as by properly instructing the student of medicine in Oto-Laryngology, we will do much to avoid the conditions which now lead to the foisting of vast numbers of what we may style pseudo-specialists upon the public. To quote Mygind (b) again, "a few cases examined and followed thoroughly, teach the student to observe and give him better experience than a great number of cases examined superficially."

"Individual instruction" as pointed out above demands competent assistant instructors, but the governing boards of our universities must be compelled to realize the absolute necessity which exists for the proper balancing of the medical curriculum, so as

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(a) B. M. J. Aug. 24, 1912. (b) ibid.

to turn out all round general practitioners and must provide the equipment therefor.

Another point which your committee deem worthy of criticism in dealing with these reports is the scope of the instruction with regard to text-books. Such a course should get as far away from the text-book as possible. We cannot in the least agree with the gentleman who reported in answer to question five, "that the contents of the required text-book on these subjects should be covered, *chiefly by recitations.*" (Note the italics.) The student should be led to read up the cases he sees in one of the many excellent text-books which are at his command, but to cover a text-book by recitation is simply waste time, and must lead to superficiality.

Every student of medicine has a right to graduate primarily as a general practitioner. The first task of every general practitioner is diagnosis. No amount of text-book recitation will develop the ability to diagnose correctly in oto-laryngology, unless there go beforehand the visual knowledge of the normal as contrasted with the abnormal, the education of the eyes, ears and fingers. This education means actual work upon the patient and the "course of instruction" should therefore be almost wholly clinical.

As regards the order in which instruction should be given, some of the teachers feel strongly that any didactic instruction should be given as the finale, to enable the student to co-ordinate his observations and place them in related groups.

By question five we hoped to elicit a sufficient answer to a difficult problem. With the daily advance of medical science, new subjects are with loud voices demanding admission to an already overburdened course, and even in those universities where the course is one of five years, it is being found needful to relegate some of the science subjects to the preparatory course, so as to give the student time to digest what he sees daily in the wards. The best of judgment is therefore called for in determining what shall form a part of the minimum curriculum in medicine. On the other hand as Gradenigo (c) has pointed out, "What doctors need in their daily practice should be made compulsory without expecting them to be familiar with complicated examinations and operations." This states in a nutshell what should be included in the "course of instruction" in oto-laryngology. The student should therefore be made thoroughly familiar with the

(c) Trans. A. L., R. & O. 1911.

anatomy, be taught the use of the instruments of examination, be able to recognize the normal parts, be familiar with their appearance in the acute inflammations, and in the commoner chronic affections, and finally be able to recognize and understand the principles of treatment of the acute affections.

With this information in his possession he will have a solid foundation upon which to build his superstructure, will be able to read his text-book in connection with a given case intelligently, obtain a comprehensive knowledge of the condition of the various organs of his patient, and finally be in a position to secure early and useful assistance from the specialist. Inability to examine a larynx has often led to a failure to recognize malignant disease in its incipient stages, and many examples will occur to all of us, where the lack of training of the student has been to the great suffering of his patient, and the disgrace of the practitioner. Such a course will, however, not be complete without instruction from his professor as to what symptoms demand the skill of the specialist, and the unwisdom and criminality of failure to refer the case for examination by the thoroughly trained specialist when such symptoms arise.

The question regarding operations was intended to raise the point that except where emergency aid is required, as in myringotomy, intubation and tracheotomy, the general practitioner should not undertake even the removal of tonsils, because every operative procedure in oto-laryngology is attended by risks which call for special training and special skill. The student has a right, however, to understand the way in which the condition of the patient may be improved by skilled operative procedure.

The last question elicited practically unanimous replies that a separate examination conducted by the professor of Oto-Laryngology should form an integral part of the final examination. The association of a question or two on the ear, or throat, upon the paper in surgery must be relegated to the past.

Your committee therefore beg to recommend for your adoption the following as the minimum requirements of the undergraduate course in oto-laryngology:

First. That each student of medicine is entitled to receive sufficient instruction in oto-larynology to enable him to deal with the parts concerned as intelligently as with the rest of the human body.

Second. That for this purpose he should be familiar with the anatomy of the parts, possess a practical working knowledge of

the simpler instruments of examination, be able to recognize familiarly the normal appearance of the structures, be practically acquainted with the pictures presented by the acute inflammations, and the commoner diseases of the organs involved, and how to treat the same. He should further be instructed to recognize the symptoms of serious complications, the wisdom of early associating the greater knowledge of the specialist in the care of his patient, and the dangers associated with all operations upon the parts involved, except in the hands of the competently trained specialist.

Third. That for this "course of instruction" a share of each of the two final years of the medical curriculum is essential.

Fourth. That the said "course of instruction" should embrace both clinical and didactic teaching, preferably intermingled, the clinical to be greatly in excess of the didactic, at least in the proportion of three to one.

Fifth. That clinical instruction should be given to small groups of students, preferably in classes of six, each receiving individual instruction, and this together with the didactic work should extend over a period of at least forty hours in the time of each student in each of the two years.

Sixth. That operations should not form any part of the above course, except that in so far as may be possible, each student should be permitted to assist at the performance of the simpler varieties, that he may become practically acquainted with the methods of procedure and the objects sought.

Seventh. That a special separate examination in oto-laryngology, preferably clinical, conducted by the professor of oto-laryngology, should form part of the final examination in medicine of every university and every licensing body.

Eighth. That a copy of these resolutions be forwarded to the medical faculty of every university and college of medicine, as well as to every state or provincial examining board, in the United States and Canada.

Second: "The Teaching of Oto-Laryngology to Post-Graduates."

The second part of our report concerns post-graduate instruction in oto-laryngology, and while the former was aimed at the production of the well rounded general practitioner, this must endeavour to achieve the evolution of the scientific specialist.

The subject is much to the fore on this continent and elsewhere. Last year the Journal of Laryngology, Rhinology, and Otology,

published an able series of articles upon the education of the specialist in throat, nose and ear disease, in Denmark, Germany, Italy, Austria-Hungary, and France. In Britain it formed a topic of general discussion at the Liverpool meeting of the British Medical Association. On this continent, it has led to the publication of recent papers by Shambaugh (d), Ellett (t), Cragin (f), and others, and formed the basis of an interesting discussion before this society two years ago, a discussion which led to the formation of the committee now reporting. A pronouncement by this important organization will therefore be quite apropos at this serious juncture, for we must not forget that with privilege comes responsibility and this society whose membership is so extensive and whose influence so wide-spread, should, noblesse oblige, lead, not follow in the making of an intelligent public opinion.

In opening the discussion of the question before the British Medical Association, Mygind (g) of Copenhagen stated that "Although there is no regular system of education of the specialist in oto-laryngology in Germany or Austria, we may divide the practical education into three stages, through which the specialist generally passes both in these two countries and in most other continental countries.

1. The first stage: The preliminary education which each student receives at the university . It is compulsory in most continental countries and extends over a period of one term.

2. The second stage is represented by the education which many future specialists receive, after having left the university, at one of the numerous post-graduate courses, which nearly every university, and many hospitals offer, and which are given either by professors, or by privat-docents attached to the university. In Austria they are, according to Frey, divided into six different kinds: (A) clinical diagnosis and treatment, (B) functional tests, (C) bedside work, (D) surgical practice on the cadaver, (E) practical treatment and minor operations in out-patient department, (F) demonstrations and lectures on normal and pathological anatomy, histology, and physiology, to which quite lately has been added, (G) pathology and diagnosis of labyrinthine diseases.

3. The third stage is the education the future specialist receives as assistant at a special clinic attached generally to a university or a general hospital.

(d) Jour. Am. M. A., Sept., 1912. (e) Southern Med. Jr., Jan., 1911.
(f) Medical Record, Vol. 80. (g) B. M. J., Aug. 24, 1912.

The third stage is undoubtedly the backbone of the whole education of the specialist, and it is only a rare exception that a medical man on the Continent nowadays is universally recognized as a specialist without having been for some time assistant at a public clinic. In Germany and Austria, and also in some other Continental countries, so much stress is laid upon this part of the education that one often meets specialists of a considerable scientific reputation remaining for a considerable number of years assistants at a special clinic, in order to stand a good chance when a chair in oto-laryngology is vacant at a university. After having been appointed an assistant for a considerable period at a special clinic, and after having given proofs of scientific ability,—in Germany an officially approved dissertation must be printed—the specialist may have in Germany, Austria, and Italy, the title of privat-docent conferred upon him by the university.

This gives him the right of teaching in the university and enrolls him in that high but by no means numerous class of specialists from whom the professors are chosen."

Up to the present on this continent, there is no recognized portal to the specialty. On the other hand the gates may be said to be many and yet "mirabile dictu" our towns and villages and even our cities are filled with "specialists" who have entered by no gate whatever, but have simply "climbed over the wall," and are to some extent at least, to be considered merely as "thieves and robbers."

The house-surgeon attached for three months to the oto-laryngological service of a hospital, the general practitioner who derives his knowledge of the subject from a six weeks' course in a post-graduate school, and the man who takes a run in Europe immediately after graduation, alike think themselves worthy to be ranked as specialists.

As long ago as 1892, Osler (h) pointed out that there is "serious danger in the attempt to manufacture rapidly a highly complex structure from ill-seasoned material."

As Shambaugh says, (j) "there is a deplorable lack of proper standard in medical education, and the specialists of the eye, ear, nose and throat, have had to carry a disproportionate share of these ill-trained practitioners."

Again as Amberg (k) I. A. M. A., Feb., 1912, so clearly puts it: "From the standpoint of a well regulated and governed com-

(h) B. M. and S. J., 1892. (j) Jr. A. M. A., Sept. 21, 1912.

munity, it represents anarchy and anarchy is the absence of government, the state of society in which there is no supreme power."

It is time we had done with this farcical sort of preparation, if our specialty, worthy as it is of the best, is not to be dragged in the mire, as a result of the ignorance of anatomy, diagnosis, and technique, displayed by a very large proportion of the rank and file of those who now style themselves "Specialists in Diseases of the Ear, Nose, and Throat."

We all know the facts, and we deplore them—now what can be done to face and overcome the difficulties of the situation. We must first decide what constitutes the standard of proper training, then provide for its acquirement, and finally bring such influence to bear upon state legislatures as to secure the legal enactment that only specialists provided with this training may practice as such.

Those who have written upon this subject are agreed that not less than two years should be devoted to preparation for practice as a specialist; this should, however, be preceded by one or more years spent in general practice, or better as house-man in the medical and surgical services of a good hospital, at least half the time being devoted to surgery. The specialist course itself must embrace highly specialized studies in the anatomy, physiology, embryology, pathology, physics, and therapeutics, which bear upon the subject; operations on the cadaver, etc.

The time required for this course will occupy at least six months. In addition the candidate must subsequently serve as a resident assistant in a special hospital or in a similar position in the special service of a large general hospital, for a period of not less than eighteen months, and to provide sufficiency of experience, the special clinic should work daily, and should have at least fifteen beds assigned to its use. In this connection it is well to insist that during the last six months of his service, the candidate shall act as a senior assistant in the major operations and personally perform those less important.

Where shall such training be provided? Without doubt the scientific part must be placed solely under the control of the universities, for these are the proper bodies to provide post-graduate instruction. Inasmuch as the universities are amenable to the public opinion of such bodies as our own, and as they stand for increasingly higher ideals, there is a guarantee that the instruction provided would be thoroughly scientific and comprehensive.

Not every university could at present undertake such post-graduate instruction, but a few judiciously selected centers could

be found even now, where such courses as we suggest could be given.

With regard to the hospital training of the candidates we are not so limited. Several first class special hospitals exist whose house-men are in demand by institutions which cannot now train their specialist juniors.

The terms of services in these special hospitals are, so far as we know, never less than eighteen months.

In the special services of the larger general hospitals it is becoming increasingly common for the house surgeon in oto-laryngology to be obliged to serve for eighteen months, to confine himself to these subjects only, and to be selected from applicants who have been several years out of college and who have decided to devote their future to oto-laryngology.

It would not be difficult to draw up a schedule of the requirements which such institutions must fulfill if their certificates of services rendered are to count in the qualifying of candidates.

It would not be necessary to confine the candidate to such positions as he could find on this continent, and in any event there might easily be arranged provision for the candidate pursuing further study in Europe.

To add a fitting coping stone to the structure whose erection we are considering the candidate should finally be compelled to present himself to one of the universities supplying the post-graduate instruction indicated above for examination on the work embraced in the entire course, and the successful candidate should be given a degree, that of Ph. D. (Oto-Laryngology), has been suggested in several quarters.

In sketching the above course we have drawn nothing fanciful, for at the present time every man who is desirous of placing himself at the top of the ladder in our specialty, in one way or another pursues such a course of study, but often finds with regret that he has not been wisely advised in his choice of work, and places to work in, and there is no arrangement for the examination anywhere, except that indicated in the above quotation from Mygind, viz., in Germany.

The final step, that of securing legislative measures, would of necessity be difficult to attain, but public opinion will ere long demand that we be protected from the incompetent specialist as we are now from the ill-trained dentist.

The programme sketched above takes no account of the post-graduate school as at present organized nor need it do so. The

case against the present condition in post-graduate teaching has been ably stated by Birkett. (1) and need not be repeated here.

By no reconstruction which we know could we hope to secure any control of institutions which are simply after all incorporated for the purpose of dividends. They came into existence to fill a need produced by the poor character of the instruction in general medicine given by many of the schools of medicine, many of which were themselves proprietary, and as Shambaugh has already said, "when the undergraduate instruction in medicine has been thoroughly done, the elementary work in the specialties will not require the subsequent patching, which is all that the existing post-graduate schools are prepared to do." The Carnegie Report has already effected a marvelous change through the public opinion its revelations have aroused and the proprietary school is doomed.

With regard to post-graduate teaching in oto-laryngology, your committee beg to recommend:—

First. That the time has arrived to standardize the degree of scientific attainment, and of clinical training which shall qualify those who wish to begin the practice of oto-laryngology as a specialty.

Second. That the report of this committee now submitted forms a suitable basis for such a standardization.

Third. That a committee representing this society be appointed to work out the details.

Fourth. That the other important associations of oto-laryngologists on this continent, viz: The American Laryngological Society, The American Otological Society, The American Academy of Ophthalmology and Oto-Laryngology, and The American Medical Association be and are hereby invited to appoint representatives to act with the above committee from this society, so that the action finally taken shall represent to the fullest extent the consensus of opinion of American and Canadian oto-laryngology.

D. J. GIBB WISHART, Chairman.
S. MACCUEN SMITH,
CHARLES W. RICHARDSON.

May 8, 1913.

It was moved that the report be received, that the recommendations therein contained be adopted, and that the committee be continued. Seconded. Carried.

(1) B. M. J., Aug. 24, 1912.

DISCUSSION.

Dr. Henry L. Wagner, of San Francisco, Cal., emphasized the importance of general surgical training for specialists. The principles of general surgery should be applied to oto-laryngology, and the longer one is connected with a general surgical clinic the better.

OCULAR MANIFESTATIONS IN NASAL AND AURAL DISEASES WHICH PROBABLY INDICATE INVOLVEMENT OF THE SYMPATHETIC NERVOUS SYSTEM.

By WILLIAM H. HASKIN, M. D., New York, N. Y.

In recent years a great deal has been written about the ocular symptoms in both aural and nasal diseases, and below is given a brief summary of the many conditions which have been described by the various writers. It is unfortunate that there has been no definite system of differentiating the various symptoms, especially when considering the optic nerve. There is an absolute difference between optic neuritis and choked disc, and care should be taken not to describe the one when the other is really present. The writer has roughly grouped the numerous symptoms given as follows:—

1. Amblyopia, amaurosis, amaurotic-amblyopia, scotomas, and contracted fields.

2. Discs:—Hyperaemic, outlines pale and indistinct, congestion, margins of the nerve indistinct or hazy with hyperaemia of the disc.

3. Papillae:—White and atrophic without showing optic neuritis, prepapillary edema, papillitis.

4. Retina:—Retinitis, retino-choroiditis, edema of, detachment of, edema with exudate, swelling and tortuousity of the retinal vessels, vessels overful, general edematous condition of the fundus, hyperaemia of the arteries, pulsation of the arteries and veins.

5. Unilateral and bilateral neuritis, retrobulbar and perineuritis.

6. Vitreous opacities, exophthalmos, increased intraocular tension, edema of the upper lids, dilation of the pupil, oculomotor paralysis, abducens paralysis, disturbances of lachrymation, photophobia.

In addition to these symptoms, pain is generally present although it varies greatly in character. Dr. Sluder has also noticed disturbances of taste and has noted paralysis of the palate muscles, which are supplied by the superior maxillary branch of the fifth nerve. Intractable sneezing, profuse rhinorrhea, a tick-

ing sensation in the palate and areas of anaesthesia have also been described.

Dr. Wolf Freudenthal has reported a significant case of angio-neurotic edema of the face occurring in a patient upon whom he had previously operated for frontal sinusitis. Five years before operation she had suffered for a year with a profuse hydrorrhea nasalis of the left nostril only, which had not responded to treatment, but finally disappeared of itself. This was undoubtedly a case of true involvement of the sympathetic.

The relationship of the optic nerve to the post-ethmoidal cells and to the sphenoidal sinuses has been very thoroughly described by many, but very few have apparently noticed the intimate association existing between the fifth nerve and the sphenoids. Drs. Sluder and Onodi have also noted the proximity of the other orbital nerves to the sphenoid sinuses, and the possibility of their involvement in disease of the sinuses. The writer has never found these relationships with the exception of the second branch of the fifth nerve, which is very frequently and extensively in contact with the sinus, both the sensory portion and the motor and the sympathetic; i. e., the Vidian portion, lying on a portion of the sinus where they would be more likely to be involved, if the sinus were inflamed, than even the optic. (See illustration No. VIII). The position of the internal carotid with its acute turns, first bending forward as it enters the cavernous, then upwards and inwards at the anterior clinoid process, must keep the sinus wall away from the sphenoid, and the nerves all lie in the outer wall of the cavernous. The writer wishes to add the sympathetic nerves to the numerous relations already noted, and to emphasize the very intimate contact that exists between these nerves and the bony walls of the sinuses. As the majority of the symptoms (ocular and nasal) are due to vaso-motor disturbances, and as the sympathetic nerves are the vaso-motor nerves, it seems to the writer that we have most reasonable explanation for most of these manifestations in that they are caused by irritation of this system. An examination of the specimens will show how slightly any relationship can exist between the 3rd, the 4th, the first branch of the 5th or the 6th nerves. They all enter the cavernous sinus external to the carotid artery (which latter extends the whole length of the sinus and lies on its inner wall), being covered by its endothelial lining membrane, except the 6th, which lies on the external wall of the artery. They all enter the orbit from this

outer wall, passing through the common tendon of the orbital muscles, and the writer has yet to see a specimen showing any actual relationship of these nerves and the sinuses. With the second branch of the 5th, however, the relationship is very intimate, as said before, and the third branch is frequently in relation with the sinus, as can be shown on the specimens. Dr. Sluder even claims to have seen the Vidian nerve actually exposed in the sinus.

The writer has never been satisfied with the various theories in explanation of the many ocular symptoms in these cases in which there are no intracranial complications, orbital abscesses, or even pressure within the diseased bone sinuses themselves. He has been unable to find any reports of microscopic proof of neuritis, except where meningitis was present. It is well recognized that intracranial pressure produces characteristic disturbances and optic neuritis, brain tumors, gummata and subdural or brain abscesses are among the many things to be remembered and to be determined in our efforts to interpret the eye symptoms. The writer desires to speak only of those cases in which the ocular disturbances are relieved by treatment of the nasal sinuses. In order to fully appreciate the reasonability of the writer's views, a complete description of the anatomy and physiology of these nerves is given below, being taken from Gray's "Anatomy" and from Landois' "Physiology."

The 3rd nerve anastomoses are:—(a) on the cavernous sinus with the 1st branch of the 5th receiving its sensory fibres supplying the iris; (b) with the sympathetic through the carotid plexus, and (c) indirectly with the 6th, whereby it receives its vaso-motor fibres. It contains (1) voluntary motor fibres for all the orbital muscles except the external rectus and the superior oblique; (2) the fibres of the sphincter pupillae, which are excited reflexly from the retina; (3) the fibres for the tensor choroidae, which is the muscle of accommodation. The two latter sets form the short root of the ciliary ganglion and reach the eyeball through the ciliary nerves. This nerve controls the pupillary action associated with accommodation. Stimulation of this nerve causes contraction of the pupil, while paralysis causes dilatation of the pupil. It should be remembered that in paralysis of the 3rd nerve, the pupil will not contract either for light or for accommodation, whereas stimulation causes contraction.

The 4th nerve anastomoses with the carotid plexus and with the first branch of the 5th. It supplies the superior oblique muscle.

In describing the 5th nerve, it should be borne in mind that the origins of its sensory root anastomose with the motor nuclei of all the nerves arising from the medulla oblongata, except that of the 6th, as this fact explains the vast number of reflex relations of this nerve. As it crosses over the superior border of the petrous portion of the temporal bone, it is in direct contact with the superior petrosal sinus. It then becomes enlarged as the Gasserion ganglion, and lies directly over the carotid canal of the petrous bone and receives sympathetic fibres from the carotid plexus. Landois says that it also receives fibres from the cavernous plexus. The following description of the 1st and 2nd branches is given in full from Landois, and should be carefully studied. (See illustration No. II).

I. The ophthalmic division receives sympathetic fibres (vaso-motor nerves) from the plexus cavernosus; it passes through the superior orbital fissure (sphenoidal) into the orbit. Its branches are:—

1. The small recurrent nerve which gives sensory branches to the tentorium cerebelli. Fibres—the vaso-motor nerves for the dura mater—proceed along with it from the carotid plexus of the sympathetic.

2. The lachrymal nerve gives off:—(a) Sensory branches to the conjunctiva, the upper eyelid, the neighboring part of the skin over the temple; (b) true sensory fibres to the lachrymal gland. Stimulation of this nerve is said to cause a secretion of tears, while its sections prevents the reflex secretion excited through the sensory nerves of the eye. After a time, section of the nerve is followed by a paralytic secretion of tears, although the statement is contested by Reich. The secretion of tears may be excited reflexly, by strong stimulation of the retina by light, by stimulation of the first and second branches of the trigeminus, and through all the sensory cranial nerves.

3. The frontal (f)* gives off the supratrochlear, which supplies sensory fibres to the upper eyelids, brow, glabella, and those which excite the secretion of tears reflexly; and by its supraorbital branch (b), analogous branches to the upper eyelid, skin of the forehead, and the adjoining skin over the temple as far as the vertex.

4. The nasociliary nerve (nc) by its infratrochlear branch supplies fibres, similar to those of 3, to the conjunctiva, carun-

*All letters in brackets refer to illustration No. 1.

cula, and sacculus lachrymalis, the upper eyelid, brow, and root of the nose. Its ethmoidal branch supplies the tip and alae of the nose, outside and inside, with sensory branches, as well as the upper part of the septum and the turbinated bones with sensory fibres, which can act as afferent nerves in the reflex secretion of tears; while it is probable that vaso-motor fibres are supplied to these parts through the same channel. (These fibres may be derived from the anastomosis with the sympathetic). The naso-ciliary nerve gives off the long root (1) of the ciliary (c) and 1 to 3 long ciliary nerves. (See No. 1).

The ciliary ganglion, which according to Schwalbe, perhaps belongs rather to the third than to the fifth nerve, has three roots—(a) the short or oculomotorius; (b) the long, (L), from the naso-ciliary; and (c) the sympathetic (s) sometimes united with (b), from the carotid plexus. The short ciliary nerves (t), six to ten in number, proceed from the ganglion, along the long ciliary nerves, to near the entrance of the optic nerve, where they perforate the sclerotic coat and run forwards between it and the choroid. Tiedemann says that it also communicates with Meckle's.

Ciliary Nerves—Physiologically these nerves contain: 1. The motor fibres of the sphincter pupillae and the tensor choroidae from the root of the oculomotorius.

2. Sensory fibres of the cornea, which are distributed as excessively fine fibrils between the epithelium of the conjunctiva bulbi; they perforate the sclera. These fibres cause a reflex secretion of tears (N. lachrymalis) and closure of the eyelids (N. facialis). Sensory fibres are supplied to the iris (pain in iritis and operations on the iris), the choroid (painful tension when the ciliary muscle is strained), and the sclerotic.

3. Vaso-motor nerves for the blood vessels of the iris, choroid, and retina. They arise in part from the sympathetic root, and the anastomosis of the sympathetic with the ophthalmic division of the trigeminus. The iris and retina receive most of their vaso-motor nerves from the trigeminus itself, and a few from the sympathetic direct.

4. Motor fibres for the dilator pupillae, which for the most part are derived from the sympathetic, through the sympathetic root of the ganglion and the anastomosis of the sympathetic with the trigeminus. Some observers deny altogether the existence of a dilator pupillae muscle. The ophthalmic division contains

independent fibres for the dilatation of the pupil which arise in the medulla oblongata and proceed directly into the ophthalmic or arise from the Gasserian ganglion.

After section of the trigeminus the pupil becomes contracted after a short period of dilatation (rabbit, frog), but this effect is not permanent. After excision of the superior cervical ganglion of the sympathetic, the power of dilatation of the pupil is not completely abolished. The narrowing of the pupil which follows section of the trigeminus in the rabbit, and which rarely lasts more than half an hour, may be regarded as due to a reflex stimulation of the oculomotorius fibres of the sphincter, in consequence of the painful stimulation caused by section of the trigeminus.

Stimulation of the cervical sympathetic—either in the neck or in its course to the eye, when the peripheral end of the cervical sympathetic is stimulated besides causing constriction on the blood vessels on that side of the head, there is dilatation of the pupil, as well as contraction of the smooth muscular fibres (Müller's muscle) in the orbit and eyelids. The membrane of the inferior orbital fissure (spheno-maxillary fissure) in man has a layer of smooth muscle, one millimetre thick, and arranged for the most part longitudinally. Both eyelids contain smooth muscular fibres which serve to close them; in the upper lid they lie close under the conjunctiva. Tenon's capsule also contains smooth muscular fibres. The sympathetic nerve supplies all these muscles (the orbital muscle is partly supplied from the spheno-palatine ganglion). Hence stimulation of the sympathetic causes dilatation of the pupil and of the palpebral fissure, with protusion of the eyeball. This result may be caused reflexly by strong stimulation of sensory nerves. Strong stimulation of the nerves of the sexual organs is followed by similar phenomena in the eye. The dilatation of the pupil which occurs in children affected with intestinal worms, is perhaps an analogous phenomena. The pupil is dilated when the spinal cord is stimulated (at the origin of the sympathetic), as in tetanus.

Section of the cervical sympathetic, besides other effects, notably those on the blood-vessels on that side of the head and face causes narrowing of the fissure between the eyelids, the eyeball sinks in its socket.

5. It is possible that trophic fibres occur in the trigeminus and pass through the ciliary nerves to reach the eye. If the trigeminus be divided within the cranium, after six to eight days,

inflammation, necrosis of the cornea, the ultimately complete destruction of the eyeball take place, constituting panophthalmia.

Section of the trigeminus paralyzes the vaso-motor nerves in the interior of the eyeball, which must undoubtedly cause a disturbance in the intraocular circulation. According to Jesner and Grünhagen, the trigeminus also contains vaso-dilator fibres, whose stimulation is followed by increased flow of blood to the eye, with consecutive excretion of the fibrin-factors and an increase in the amount of albumin of the aqueous humor. After section of the nerve, the intraocular tension is diminished (while stimulation of the nerve is followed in increase of the intraocular pressure). This diminution of the normal tension necessarily must alter the normal relation of the filling of the blood and lymph-vessels, and also the movement of the fluids, upon which the normal nutrition is largely dependent.

There are three conditions on which the above changes may depend:—(1) Mere loss of sensibility, which alone is not sufficient to explain the phenomena; (2) vaso-motor disturbance, which is excluded by the above facts, and also by the other consideration that, if the fifth nerve be divided and the superior cervical ganglion excised simultaneously, ophthalmia does not occur; and, in fact, excision of this sympathetic ganglion may modify the results of section of the fifth. Thus, we are forced to (3) the theory of trophic fibres, whose centre is the Gasserian ganglion.

Pathological.—In cases of anæsthesia of the trigeminus in man, and, more rarely, in severe irritation of this nerve, inflammation of the conjunctiva, ulceration and perforation of the cornea, and finally panophthalmia, have been observed. This condition has been called ophthalmia neuroparalytica.

There are other affections of the eye, depending upon disease of the vaso-motor nerves, which are quite different from the foregoing, as they never lead to degenerative changes. Such as ophthalmia intermittens (due to malaria), a unilateral, intermittent, excessive filling of the blood-vessels of the eye, accompanied by the secretion of tears, photophobia, often accompanied by iritis and effusion of pus into the chambers of the eye. This condition is regarded by Eulenburg as a vaso-neurotic affection of the ocular blood-vessels. Pathological observations, as well as experiments upon animals, have shown that there is an intimate physiological connection between the vascular areas of both eyes, so that affections of the vascular area of one eye are apt to induce similar disturbances of the opposite eye. This serves to explain

the fact that inflammatory processes in the interior of one eyeball are apt to produce a similar condition in the other eye. This is the so-called "sympathetic ophthalmia." It probably is affected through Ribes's ganglion. Thus, stimulation of the ciliary nerves or the fifth on one side, causes dilatation of the blood-vessels not only on its own side but also on the other side as well. The pathological condition of glaucoma simplex, where the intraocular tension is greatly increased, is ascribed by Donders to irritation of the trigeminus. (Increased intraocular tension may be produced by irritation of the secretory fibres contained in the fifth nerve, by stimulating the nucleus of the trigeminus in the medulla oblongata, and also reflexly by irritation of the peripheral branches of the fifth, as by nicotin placed in the eye. It is possible, however, that some forms of glaucoma are produced by diminished removal of the aqueous humor from the eye). Unilateral secretion of tears, due to irritation of the ophthalmic division of the fifth, has been repeatedly observed, but unilateral cessation of tears, due to paralytic conditions, very rarely. (See illustration No. III).

II. Superior Maxillary Division.

It gives off:—1. The delicate recurrent nerve, a sensory branch to the dura mater, which accompanies the vaso-motor nerves, derived from the superior cervical ganglion of the sympathetic, and is distributed to the area of the middle meningeal artery.

2. The subcutaneous maloror orbital (o) supplies by its temporal and orbital branches sensibility to the lateral angle of the eye and the adjoining area of skin of the temple and cheek. Certain fibres are said to be the true secretory nerves for tears.

3. The dental, anterior, posterior, and median, and with them the anterior fibres from the infraorbital nerve, supply sensory fibres to the teeth in the upper jaw, the gum, periosteum, and the cavities of the jaw. The vaso-moter nerves of all these parts are supplied from the upper cervical ganglion of the sympathetic.

The spheno-palatine ganglion (Meckel's ———n) forms connections with the second division. To it pass two short sensory root-fibres from the second division itself, which are called spheno-palatine. Motor fibres enter the ganglion from behind, through the large superficial petrosal branch of the facial (j); and gray vaso-motor fibres (v) from the sympathetic plexus on the carotid (the deep, large petrosal nerve). The motor and vaso-motor fibres

from the Vidian nerve, which reach the ganglion through the canal of the same name.

Branches of Meckel's ganglion.—(1) The sensory fibres (N) which supply the roof, lateral walls, and septum of the nose (posterior and superior nasal); the terminal fibres of the naso-palatine pass through the canalis incisivus to the hard palate, behind the incisor teeth. The sensory inferior and posterior nasals for the lower and middle turbinated bones, and both lower and nasal ducts, are derived from the anterior palatine branch of the ganglion which descends in the palato-maxillary canal. Lastly, the sensory branches of the hard (p) and soft palate (pl) and the tonsils arise from the posterior palatine nerve. All the sensory fibres of the nose (see also the Ethmoidal nerve), when stimulated, cause the reflex act of sneezing. Preparatory to the act of sneezing, there is always a peculiar feeling of tickling in the nose, which is perhaps due to dilatation of the nasal blood-vessels. This dilatation is rapidly caused by cold, more especially when it is applied directly to the skin. The dilatation of the vessels is followed by increased secretion of watery fluid from the nasal mucous membrane. Stimulation of the nasal nerves also causes a reflex secretion of tears, and it may also cause stand-still of the respiratory movements of the expiratory phase. (2) The motor branches descend in the posterior palatine nerve through the small palatine canal, and give off (h) motor branches to the elevator of the soft palate and azygos uvulae. The sensory fibres of these muscles are supplied by the trigeminus. According to Politzer, spasmodic contraction of these muscles occasionally cause crackling noises in the ears. (3) The vaso-motor nerves of this entire area arise from the sympathetic root; i. e., from the upper cervical ganglion, the root of the trigeminus supplies the secretory nerves of the mucous glands of the nasal mucous membrane. Thus, trophic functions for the mucosa have been ascribed to the trigeminus. (See illustration No. 5).

The 3rd branch with its otic ganglion is rarely involved in the conditions we are studying, supplying as it does the lower part of the face and neck. It is closely associated, however, with the other branches through its ganglion and through the tympanic plexus, which accounts for the pains which are often reflected to the ear when the 5th nerve is really the site of the lesion itself. Below is given the anatomy of the cephalic portion of the sympathetic, being taken from Gray's anatomy.

The Sympathetic Nerve.

The Sympathetic Nerve is so-called from the opinion entertained that through it is produced a sympathy between the affections of distant organs. It consists of a series of ganglia, connected together by intervening cords, extending on each side of the vertebral column from the base of the skull to the coccyx. It may, moreover, be traced up into the head, where the ganglia (which are all in connection with the fifth cranial nerve) occupy spaces between the facial and the cranial bones.

The sympathetic nerve, for convenience of description, may be divided into several parts, according to the position occupied by each. Of these we will briefly describe:—

1. Cephalic portion.....4 pairs of ganglia.
2. Cervical portion.....3 pairs of ganglia.

Each ganglion may be regarded as a distinct centre, from or to which branches pass in various directions. These branches may be thus arranged:— 1. Branches of communication between the ganglia. 2. Branches of communication with the cerebral or spinal nerves. 3. Primary branches passing to be distributed to the arteries in the vicinity of the ganglia, and to the viscera, or proceeding to other ganglia placed in the thorax, abdomen or pelvis.

Of these the primary branches of distribution also consist of two kinds of nerve-fibres, the sympathetic and the spinal. They have a remarkable tendency to form intricate plexuses, which encircle the blood vessels, and are conducted by them to the viscera.

The *cephalic portion* of the sympathetic consists of four pairs of ganglia:—1. The ophthalmic ganglion. 2. The sphenopalatine, or Meckel's ganglion. 3. The otic, or Arnold's ganglion. 4. The submaxillary ganglion. These have been already described in connection with the three divisions of the fifth nerve. There is also the single ganglion uniting the two sides; i. e., Ribe's ganglion.

Cervical Portion of the Sympathetic.

The cervical portion of the sympathetic consists of three ganglia on each side, which are distinguished, according to their position, as the superior, middle, and inferior cervical.

The *superior cervical ganglion*,* the largest of the three and the one which is of interest to us, is placed opposite the second and

*See illustration No. 1.

third cervical vertebrae and sometimes as low as the fourth or fifth. It is of a reddish-grey color, and usually fusiform in shape; sometimes broad and occasionally constricted at intervals, so as to give rise to the opinion that it consists of the coalescence of several smaller ganglia. It is in relation, in front, with the sheath of the internal carotid artery and internal jugular vein; behind, it lies on the Rectus capitus anticus major muscle.

Its branches may be divided into superior, inferior, external, internal and anterior.

The *superior branch* appears to be a direct continuation of the ganglion. It is soft in texture and of a reddish color. It ascends by the side of the internal carotid artery and, entering the carotid canal in the temporal bone, divides into two branches, which lie, one on the outer, and the other on the inner side of that vessel.

The *outer branch*, the larger of the two, distributes filaments to the internal carotid artery, and forms the carotid plexus.

The *inner branch* also distributes filaments to the internal carotid, and, continuing onwards, forms the cavernous plexus. (See illustration No. VI).

Carotid Plexus.

The carotid plexus is situated on the outer side of the internal carotid. Filaments from this plexus occasionally form a small gangliform swelling on the under surface of the artery, which is called the carotid ganglion. The carotid plexus communicates with the Gasserian ganglion, with the sixth nerve, and spheno-palatine ganglion, and distributes filaments to the walls of the carotid artery, and to the dura mater (Valentin), (See illustration No. VII), while in the carotid canal it communicates with Jacobson's nerve, the tympanic branch of the glosso-pharyngeal.

The *communicating branches* with the sixth nerve consist of one or two filaments which join that nerve as it lies upon the outer side of the internal carotid. Other filaments are also connected with the Gasserian ganglion. The communication with the spheno-palatine ganglion is effected by the carotid portion of the Vidian nerve, which passes forwards, through the cartilaginous substance filling the foramen lacerum medium, along the pterygoid or Vidian canal, to the spheno-palatine ganglion. In this canal it joins the petrosal branch of the facial, thus forming the Vidian.

Cavernous Plexus.

The cavernous plexus is situated below and internal to that part of the internal carotid which is placed by the side of the

sella Turcica, in the cavernous sinus, and is formed chiefly by the internal division of the ascending branch from the superior cervical ganglion. It communicates with the third, fourth, fifth, and sixth nerves, and with the ophthalmic ganglion, and distributes filaments to the wall of the internal carotid. The branch of communication with the third nerve joins it at its point of division; the branch to the fourth nerve joins it as it lies on the outer wall of the cavernous sinus; other filaments are connected with the under surface of the trunk of the ophthalmic nerve; and a second filament of communication joins the sixth nerve.

The filament of connection with the ophthalmic ganglion arises from the anterior part of the cavernous plexus; it accompanies the nasal nerve, or continues forwards as a separate branch.

The terminal filaments from the carotid and cavernous plexuses are prolonged along the internal carotid, forming plexuses which entwine round the cerebral and ophthalmic arteries; along the former vessel they may be traced on to the pia mater; along the latter, into the orbit, where they accompany each of the sub-divisions of the vessel, a separate plexus passing from the arteria centralis retinæ into the interior of the eyeball. The filaments prolonged on to the anterior communicating artery form a small ganglion, *the ganglion of Ribes*, which serves, as mentioned above, to connect the sympathetic nerves of the right and left sides.

If we now take up the physiology of the sympathetic, it at once becomes interesting in connection with our subject. The functions attributed to the cervical portion are as follows:—

1. Pupil dilating fibres. Section of the cervical sympathetic causes contraction, while irritation causes dilatation of the pupil.
2. Motor fibres for Müller's smooth muscle of the orbit.
3. Vaso-motor fibres for the outer ear and side of the face, the tympanum, conjunctiva, iris, choroid and the retina in part.
4. Trophic fibres, sweat fibres for the face and secretory fibres for the various glands, such as the lachrymal, the several salivary and the mucous glands.

With this sketch before us, the writer desires to read some extracts from a reprint recently sent to him by Dr. Gruening after having discussed the question with him. In it he says: "That at times the statement is made that an optic neuritis has developed into a choked disc thus implying that choked disc is a more advanced stage of optic neuritis." This he says is an erroneous view. He describes choked disc as having an initial, an intermediate and advanced stage, every one of which is the

ophthalmoscopically visible expression of increased intra-cranial pressure. He then tells us why it is that, when an optic neuritis is present, there is never any choked disc because the inter vaginal spaces are sealed by exudative material so that the serum does not enter lymph spaces of the optic nerve and the perilymphatic sheaths of the optic and retinal vessels. He then asks this pertinent question: "How can the choking of the disc, which is so far from the area of the disease, in purulent middle ear disease be explained?" He acknowledges in answer to this question that there is no succinct and lucid explanation of this inter-relation. He then asks: "But what causes the excess of the cerebrospinal fluid," and in answer says that the theory of chemo-taxis, as defined by Theodor Leber, may furnish the clue. That theory is a most difficult one to understand and to the writer cannot explain why one orbit is so often affected and not both. Dr. Gruening also writes that another point of interest is that the degree of swelling may vary in the two discs. As we assume that the hydrostatic pressure is equal at all points within the brain cavity, there must be structural conditions causing these variations. In conclusion he says: "That further confirmation that we have not to deal with inflammatory action and destruction of the nerve tissue in choked discs in otitic cases is supplied by the fact that on removal of the purulent area, the optic nerve returns to the normal." When such an authority as Dr. Gruening offers such a paper before the International Otological Congress it seems to be pretty conclusive evidence that, as yet, but little is known of the true conditions which are manifested in the eyes and affords the writer some excuse for the length of the present paper. He asks that you bear well in mind: 1—That the sympathetic nerve is the vaso-motor nerve of the eye, that is, it controls the blood supply. 2—That these nerves after leaving the superior cervical ganglion form the carotid plexus and then on entering the cavernous sinus form the cavernous plexus and lie on its inner wall in contact with the sphenoids. 3—That the branches after leaving these plexuses often run through small bony canals in the walls of cavities or sinuses that become inflamed, such as the Vidian, the greater and lesser petrosal nerves and the branches entering the tympanum. Remembering the above relations and considering that almost all of the ocular disturbances are true disturbances of the vaso-motor system, it seems to the writer that the rational explanation of these symptoms lies in correctly attributing them to the sympathetic nerve. The

delicate fibres of this system are much more exposed to irritation from inflammations in the accessory sinuses and even in the ear than any of the other nerves and reference to the physiology will show that any or all of these ocular symptoms have actually been produced by experiments on these nerves. Dr. J. D. Richards describes two cases of pupil dilatation following extensive exenteration of the petrous bone with exposure of the carotid artery in its canal and attributed the dilatation to irritation of the plexus. In both cases although the dilatation was very marked, still there was reaction to light and to accommodation, showing that the disturbance came through the fifth nerve. Although all writers maintain that choked disc is always caused by increased intra-cranial pressure, in most of our cases there are absolutely no other symptoms of this condition present and it is certainly remarkable that in most cases the eye conditions clear up as soon as the local nasal or aural disease is cured or the irritation removed. Again, it is a very significant fact that in many cases where operation has cured the nasal disease and the eye symptoms have been relieved, that an acute exacerbation will often be accompanied by a return of the eye symptoms which will again disappear with the cure of the attack. True paralyses of the orbital muscles are not common and are difficult to explain. However, the intimate relation of the sixth nerve with the inferior petrosal sinus as it pierces the dura, and then with the interior of the cavernous sinus itself accounts for its implication whenever these sinuses are thrombosed.

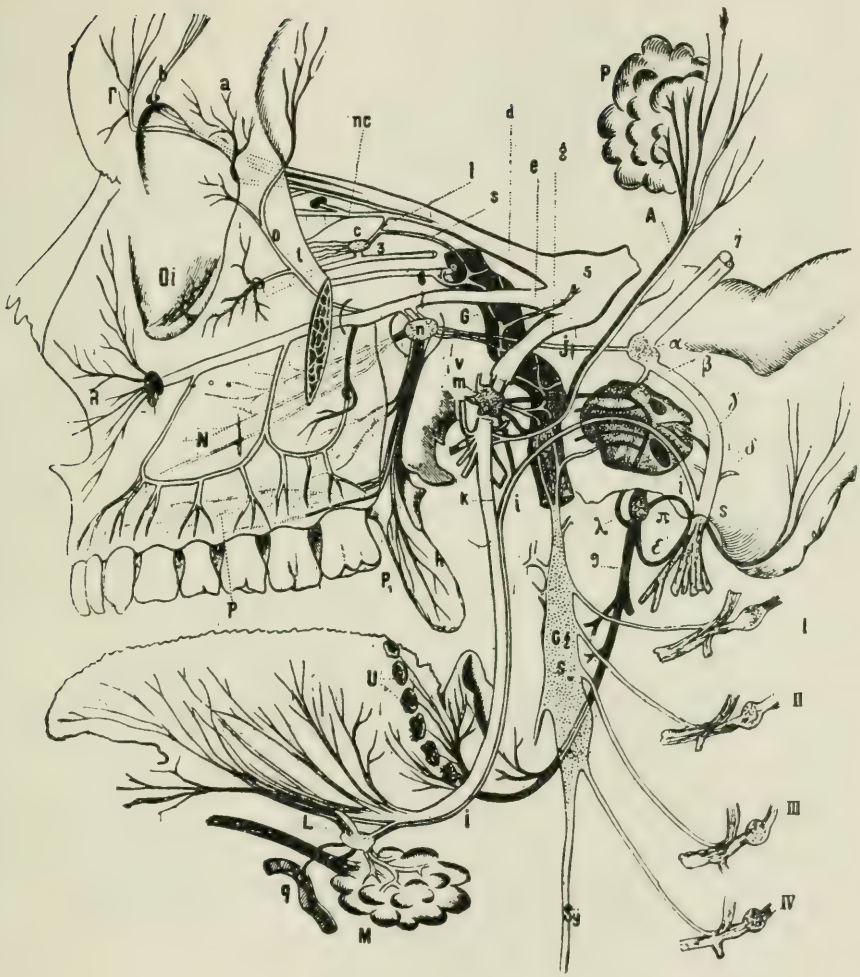
Dr. Sluder has written often concerning the spheno-palatine ganglion and his method of treating it. He has undoubtedly been very successful, but an examination of the specimens presented will show how difficult it is to reach this ganglion itself, and only an unusually skillful man with an absolute appreciation of the anatomy had better attempt these injections. It has required much time and great care for the writer to open the specimens in order to actually show the ganglion in its place where it is enmeshed in many blood-vessels.

Let us look at the disease called glaucoma. This disease consists of a great increase in the intraocular tension (due to vasomotor disturbances) and frequently destroys the eye if not promptly relieved. Dr. Sluder reports ten cases of glaucoma in which he has relieved the pain by cocainization of the spheno-palatine foramen. Lapersonne and Fisch have reported cases of increased intraocular pressure caused by accessory sinus disease.

Now turn back to the section on physiology and, under the ophthalmic branch of the fifth nerve, you will find that Donders has ascribed the greatly increased intraocular tension to irritation of the trigeminus. Read also in the same paragraph what Eulenberg says about ophthalmia intermittens, which he describes as a vaso-neurotic affection of the ocular blood-vessels. This paragraph, in conclusion, says that there are other diseases of the eye depending upon disease of the vaso-motor nerves which are peculiar in that they do not lead to degenerative changes. Amaurosis, i. e., weakness of the vision, and amblyopia frequently result from optic neuritis but, Landois says, that both may be the signs of disturbances in other organs, that they may be sympathetic signs due to changes in the movement of the blood-stream, depending upon stimulation of the vaso-motor nerves. In fact, a careful study of the physiological experiment upon the orbital nerves and especially the sympathetic branches will disclose the fact that all of the ocular manifestations that we see and that have been so frequently described have been caused by section of or by irritation of the sympathetic nerve supply. There is one more point the writer in closing wishes to suggest and that is the probable influence of the trophic nerve fibres. These are also sympathetic fibres conveying impulses from the centres to the periphery. Their end organs lie in the tissues themselves although little is known about them. They are called trophic because they are supposed to govern or control the normal metabolism of the tissues. There are many diseases attributed to disease of these fibres of the centres from which they spring, such as the various forms of herpes, the condition known as "glossy skin," progressive muscular atrophy, myxodaema (seen in the nose as polypi), leucoderma, Addison's disease, anæsthetic leprosy and acute decubitus or bed-sores. All nerves are supplied with trophic fibres and it naturally follows that if these nerves become diseased and are destroyed that the nerve supplied by them will also atrophy and lose its function. To the writer, this supplies a reasonable theory to explain why in cases of long standing disease of the sinuses, the disturbances of vision do not recover after the sinus disease has been cured, although in recent cases vision almost invariably does return. Irritation of any tissue for a short period of time will not produce any actual tissue change, but long continued irritation will gradually produce actual destruction and that is what probably does take place in these eye

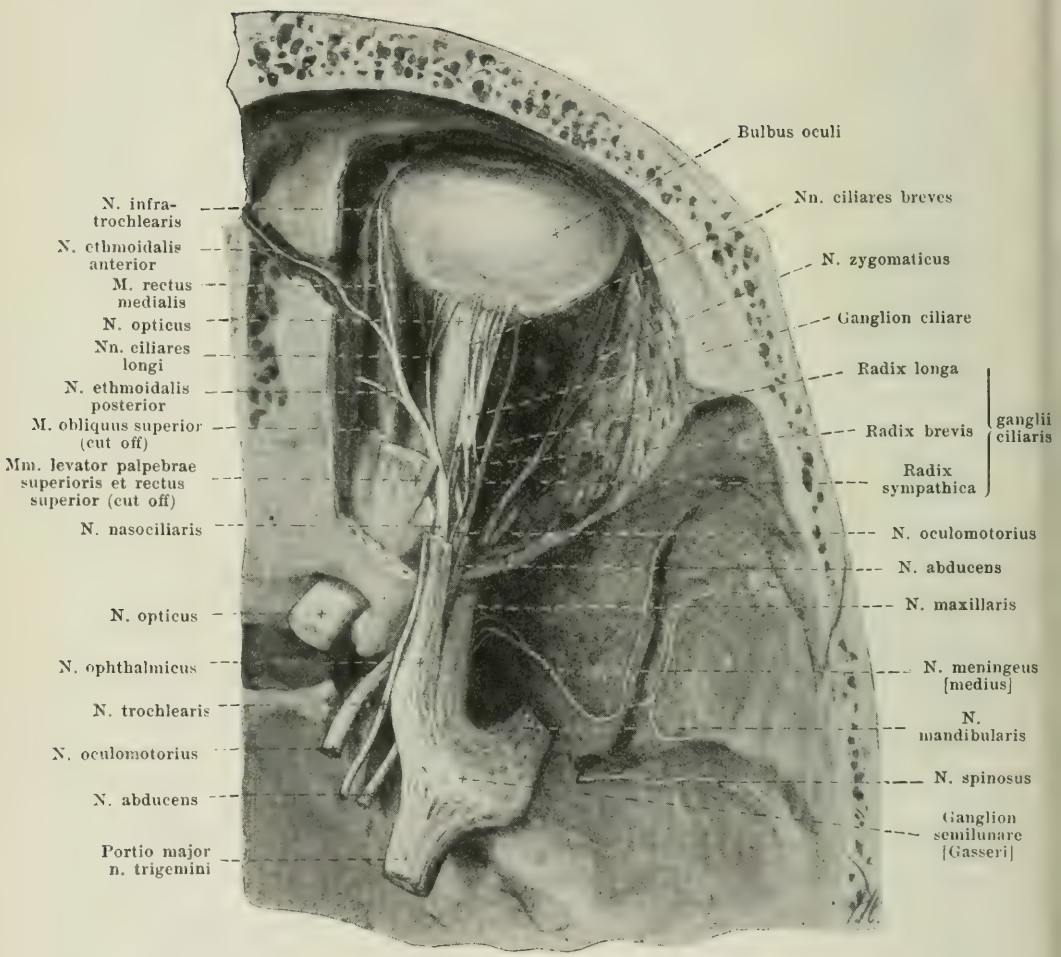
cases. At first, the sympathetic nerves are merely irritated by the inflammatory sinus and produce the symptoms of increased vaso-motor action but after long irritation, the trophic nerves become destroyed and thus destroy the trophic control of the optic and it loses its function, although an actual neuritis has never been present. When we consider that the majority of nasal affections are affections of the vaso-motor nerves and then realize that these same vaso-motor branches are so intimately associated with the sphenoid sinuses, even before they join their individual ganglia, it does not seem to be unreasonable to advance the theories advanced in this paper and the writer hopes that it will help all in the true interpretation of cases to be seen.

The writer desires to thank J. B. Lippincott & Co., and P. Blakiston's Son & Co. for their very kind permission to use the illustrations appearing in this article which are so much better than he could have prepared himself.



(LANDOIS PHYSIOLOGY)

Fig. 1. Cranial sympathetic nerve anastomoses.



(SPALTEHOLTZ ANATOMY.)

Fig. 11. Ophthalmic branch of the fifth nerve with Gasserian and ciliary ganglia.

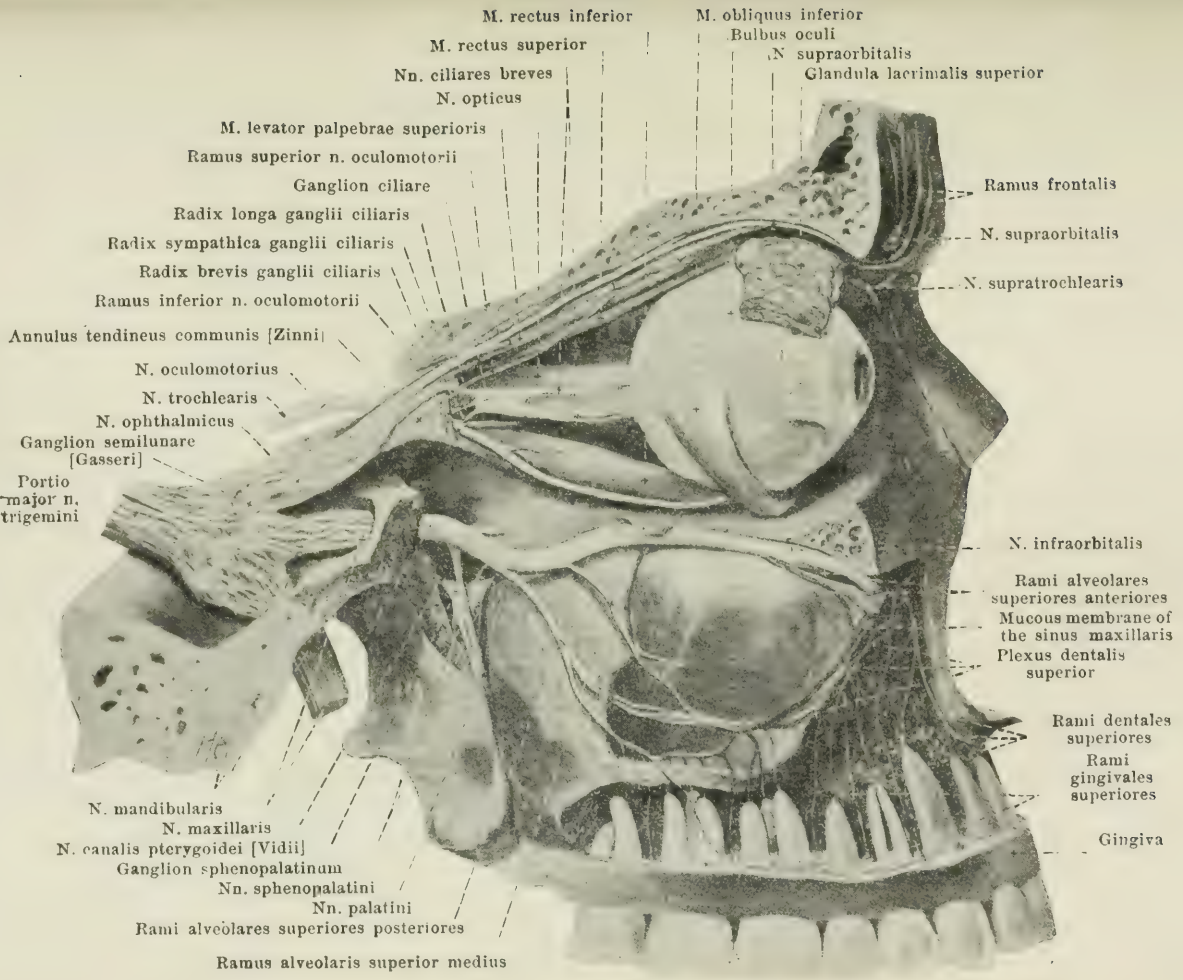
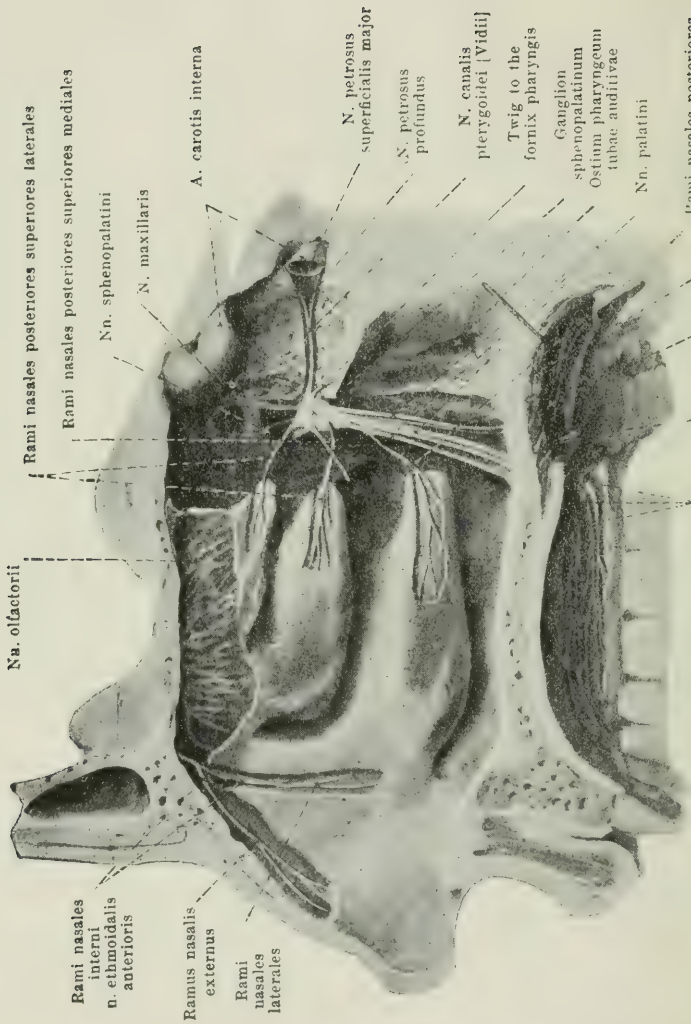
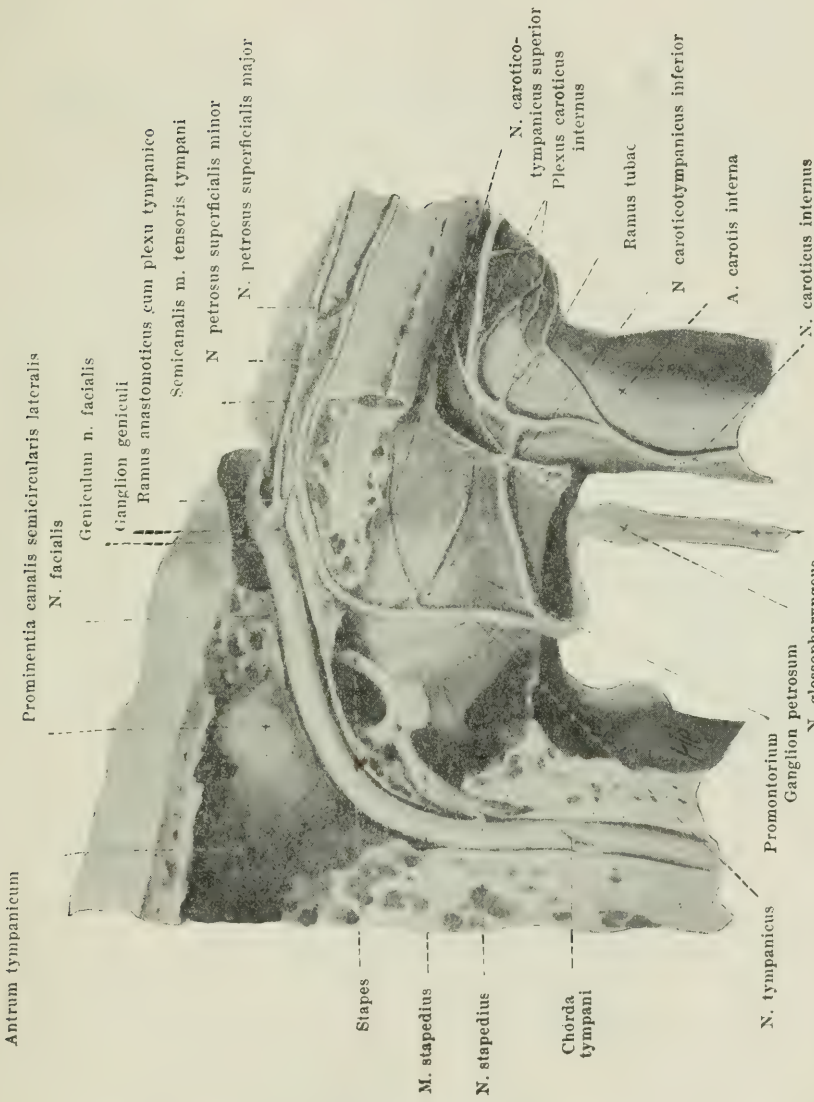


Fig. 111. Ophthalmic and superior maxillary branches of the fifth nerve showing Gasserian, ciliary, and sphenopalatine ganglia. (SPALTEHOLTZ ANATOMY.)



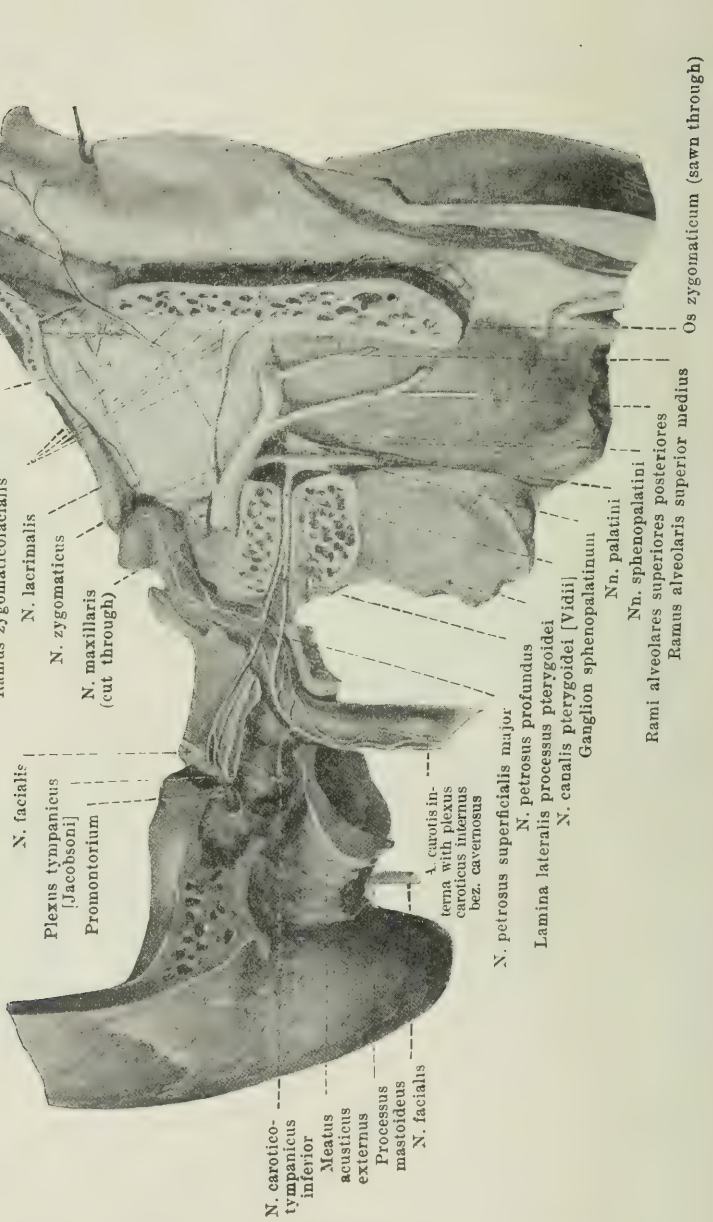
(SPALTEHOLTZ ANATOMY.)

Fig. IV. Sphenopalatine ganglion with afferent and efferent branches.



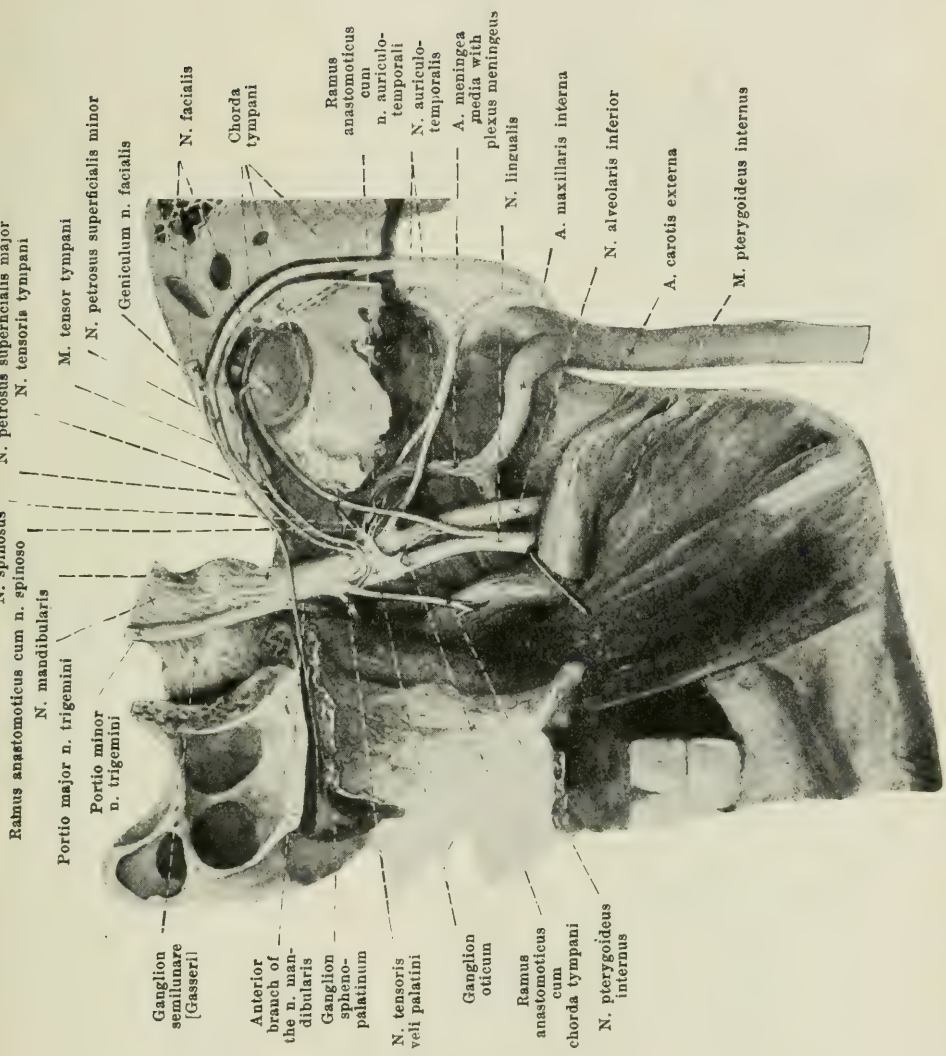
(SPALTEHOLTZ ANATOMY.)

Fig. V. Tympanic plexus anastomoses with carotid plexus, geniculate and petrosal ganglia.



(SPALTEHOLTZ ANATOMY.)

Fig. VI. Course of the internal carotid artery with carotid and cavernous plexuses, Vidian nerve and sphenopalatine ganglion.



(SPALTEHOLTZ ANATOMY.)

Fig. VII. Inferior maxillary branch of the fifth nerve, showing the ganglion with its tympanic anastomoses.

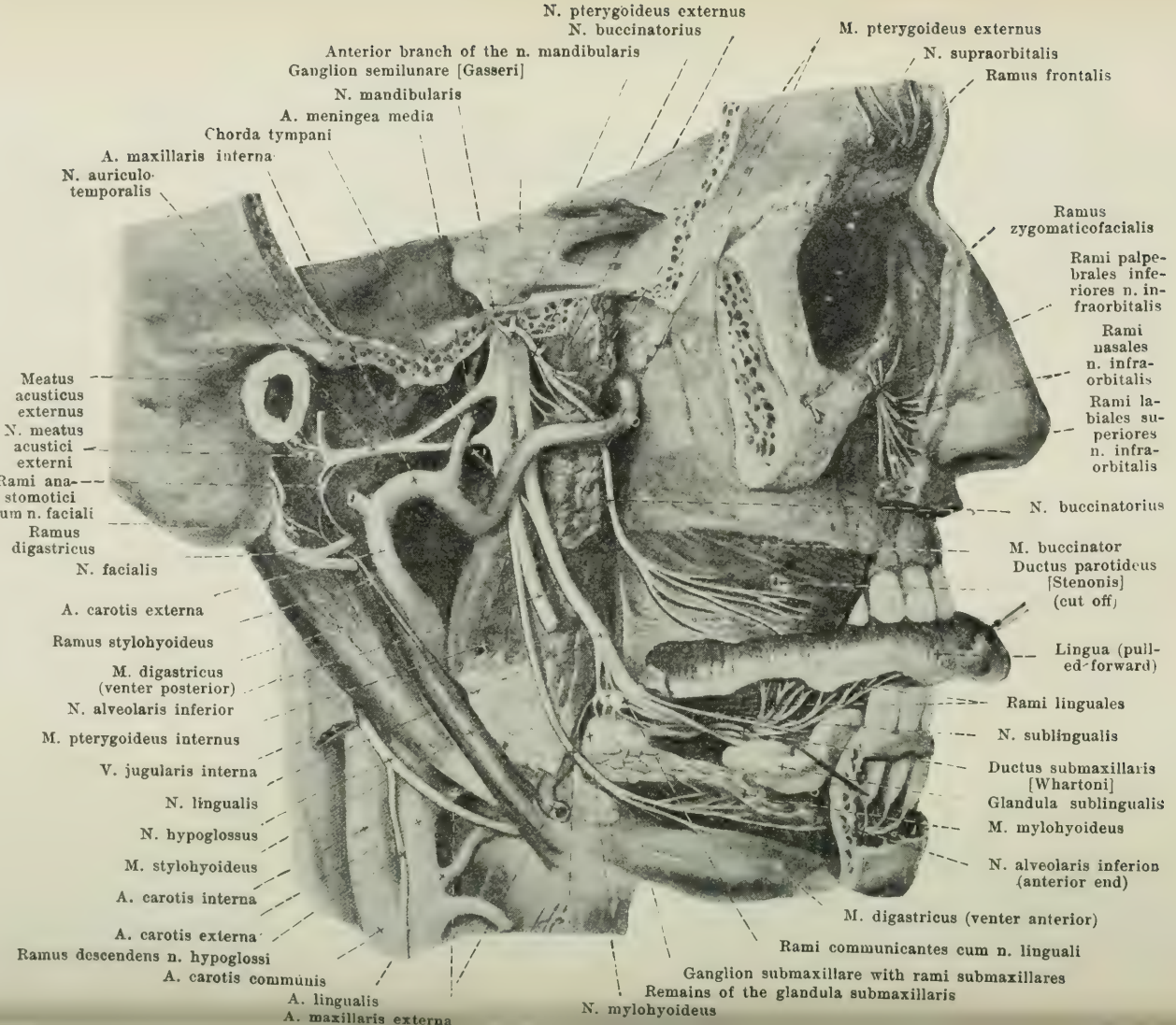


Fig. VIII. Gasserian ganglion, distribution and anastomoses of the inferior maxillary branch and submaxillary ganglion. (SPALTEHOLTZ ANATOMY.)

THE HISS LEUCOCYTE EXTRACT IN COMPLICATIONS OF NASAL AND AURAL SURGERY, WITH REPORT OF CASES.

By WILLIAM H. HASKIN, M. D., New York, N. Y.

In 1910, my associate, Dr. J. G. Dwyer, published a most valuable paper on the use of vaccines, serums and the Hiss leucocyte extract, and it is to report the further results of the use of this extract that this paper will deal. In the death of Prof. Hiss the profession has lost one of its most brilliant, enthusiastic and scientific members. His first report on this extract was published in the Journal of Medical Research in November, 1908, and gave in detail the results of his experiments and the exact method for the preparation of the extract. His work had extended over a period of two years, so that even in his first paper he only offered a thing that had actually been tested and had given results. It has been asked a thousand times—Why hasn't he published his further work? The only answer is that he was almost totally deaf and suffered with the extreme diffidence that these unfortunates so often have, and also, it is probable, that he knew that he was a doomed man for nearly four years, dying as he did from multiple melanotic sarcoma, which had destroyed one eye about a year and a half before his death. He has left a monument with us that will remain, and it is sure to prove to be one of the greatest mainstays that we have yet had given to us. It may not be that his extract, as prepared today, will continue in use, but there is no question but that the principles upon which he worked and formed his theories are absolutely logical and that any further investigations along this line will be the direct result of his legacy, and credit should be given him for his discovery. After his assistant, Dr. Hans Zinnser, went to California in 1909, Prof. Hiss became still more diffident and retired into the seclusion of his laboratory almost entirely. He told me, several months before his death, that had not Dr. Dwyer come into his life, any further work with the extract would probably have stopped in 1910. A very strong friendship arose between them in 1910, and for the first time Prof. Hiss had a man to follow up the clinical use of his preparation, in whom he had entire confidence, so that the many trials in actual practice have been due to Dr. Dwyer's enthusiasm and

devotion to Prof. Hiss, who never would go out to see a case himself but always sent his new found friend. As Dr. Dwyer has been with me both in my office and hospital work ever since he entered practice, it is very natural that I, too, have become an ardent believer in the efficacy of this product, and have asked to read this paper only after being told that it was impossible to have it done by Dr. Dwyer, to whom so much of the credit is due for the brilliant results that have been procured. It is necessary to read Prof. Hiss's theoretical considerations, which led to his experimental work upon leucocyte extracts and infections, in order to fully understand the rationality of his work. He says that: "In thinking over this work I came to the conclusion that in many diseases we are probably dealing with an immunity a large part of whose mechanism is individually cellular, not only in the sense of phagocytosis and digestion, but in the neutralization of poisons given rise to by the disintegration of the bacteria—a mechanism in which the protecting cells must intervene and, unaided by bodies in the plasma, neutralize within themselves the poisonous products of the invading micro-organisms. It was this thought that gave rise to the further idea of aiding the leucocytes by furnishing them as directly as possible with the weapons which were being taken away from them in their fight with invading micro-organisms, and to thus protect them from destruction and give them an opportunity to recuperate and carry on successfully their struggle against the invading germs. These weapons, whatever might be their nature, I assumed might possibly be furnished by an extract of the active substances of the leucocytes themselves (substances not ordinarily given up to the plasma of serum) and I also assumed that extracts would be more efficacious than living leucocytes themselves, introduced into the infected animal, since being diffusible they would probably be distributed impartially to all parts of the body by the circulatory mechanism, and, as quickly as absorption would permit, relieve the fatigued leucocytes and protect, by any toxin-neutralizing or other power they might possess, the cells of highly specialized functions.

This idea of immunity differs from one that simply assumes the cells as the source of all immune bodies (which logically seems to be the case), in that it takes into consideration the presence and production in the leucocytes of agents, which are not normally given up to the plasma, but which are constantly able to reproduce themselves and carry on the functions of

digestion or neutralization simply for the benefit and protection of the individual cell, while not being secreted or excreted by the cells for the more general benefit of the cell community at large.

Thus we have a differentiation of immune agents into those which by virtue of their liberation and overproduction by the cells, such as the antitoxins, amboceptors, and agglutinins, etc., are free in the plasma and thus, when active, are immediately available for the protection of all the body cells; and into those agents by which certain cells primarily nourish and protect themselves, and are only of benefit to the cell community at large by virtue of the direct intervention of these cells between the invading germs and their products and the highly specialized cells requiring protection. It seems then, that when these sources of protection are overtaxed or fail to act efficiently, on account of some inherent weakness or untoward circumstance of location, that the most reasonable course is, if possible, to support the chief army of attack as indicated by a study of the exudates and pathological changes in the disease in man and animals, and to endeavor to supply those products which are most heavily taxed in the fight, in other words, to introduce into the infected animal or man, the substances composing the chief cells or all the cells of an exudate in the most available form and as little changed by manipulation as possible. Such substances, if they become free from the cells by extraction, might serve to neutralize poisons in the blood, might alone or in combination with bodies already in the blood act deleteriously on the bacteria, and thus protect and augment the activities of the flagging leucocytes by supplying them with their own weapons in the fight against the invading organisms. And further, the extracts of such exudates from previously immunized animals might even better serve this purpose, since their cells probably have in their own fight against the same organisms, gained increased powers, as is evidenced by the ability of such immunized animals to safely dispose of immense numbers of organisms without serious harm or loss of weight. Also, as a further adjuvant, immune sera might be found serviceable in some cases, especially early in the disease and when non-immune cells are being used, although it is our belief that sufficient immune bodies (bactericidal or bacteriolytic) are often present, and in sufficient amount even early in the disease, if the animal economy has not been entirely overwhelmed by an enormous primary dose of the infecting organisms or their poisons."

His paper gives the results of the curative influence of the extract in animals infected with staphylococcus, streptococcus, pneumococcus, meningococcus and typhoid bacillus; it also reports the results of its use in 24 cases of meningitis in man, and its use in acute lobar pneumonia in man.

His original results have been so fully borne out since then in over four hundred cases of various infections, most of them being desperate ones at that, it seems as though the time for doubt has gone and that we should all learn when and how to use it to the best advantage of the patient and not turn to it only as a last resort. Even a month ago two of our most prominent otologists asked me to tell them about this vaccine. It is not a vaccine or antitoxin in any sense of the words and should not be confused with them as is constantly done. My own experience with three desperate cases, all being in the hospital at the same time, gives most marked evidence of its value.

Case I.—On February 18, 1913, Sol. Z., aged 1 year, was brought to my office, being referred by Dr. H. S. David. The child had been very ill for over five weeks, running temperatures up to 105°, and with both ears discharging very profusely. The physician in charge had opened the drums several times but had failed to realize the gravity of the case and Dr. David, being a friend only, advised the parents to see me. Examination showed undoubted involvement of both mastoids, with extreme contraction of both pupils and a very suspicious, rigid contraction of the muscles of the neck. He was sent to the Manhattan Hospital at once and operated upon within two hours. Both processes were completedly disintegrated and the sinus on the left side appeared to be almost necrotic for about half an inch. An attempt was made to draw off some spinal fluid but the syringe filled with blood, or at least a dark fluid which coagulated very rapidly. At the time this gave us some uneasiness, but Dr. Ende, of the Central Islip Hospital for the Insane, assured Dr. Dwyer that this was not an infrequent occurrence in his work at the hospital and I have seen another such case since then. Blood was drawn during the operation for culture and proved to be negative. All possible speed was used, in order to lessen the shock as much as possible, and the patient was taken off the table at the end of thirty-five minutes. That night the temperature rose to 106°, and the leucocyte extract was given, and continued daily for seven days.

The temperature became lower but remained around 102° for several days. A pediatrist was called in on the seventh day to determine whether there might not be some general systemic condition that was keeping up the temperature, but he found nothing. The child improved slowly, but on the 25th day a large trophic slough was discovered over the torcula, and a day later another smaller one appeared near it on the left side. Up to this time both mastoid wounds had been doing very well, but then, healing seemed to stop and the granulations became very flabby and unhealthy. The extract was again administered for three days with remarkable effect, both the wounds and the sloughs assuming a healthy appearance, and going on from that time to complete healing at the end of the fifth week. This brief report cannot convey any idea of the desperate conditions we had to deal with, and that the child recovered is entirely due to the power of the extract in giving strength to the overtaxed body of this profoundly infected child.

Case II.—John K., aged 2 years, was brought to Dr. McKernon's clinic on March 19th, 1913, with a large subperiosteal abscess of ten days duration, and was operated upon the same afternoon (staphylococcus aurens). His temperature at the time of operation was 103°, but fell to normal the following day and remained there until the fourth day. He then became suddenly ill and the temperature rose to 104°, pulse 136, and respirations 38, and this was accompanied by a constant cough. An examination of the chest showed marked crepitations over the lower right lung and a blood count showed 43,000 leucocytes, 75% poly and 25% mononuclear cells. 10 cc. of the extract was given at once and repeated on the next day. It sounds like a fairy tale for me to tell you that the temperature fell at the end of 48 hours and that the lung conditions cleared up without going on to consolidation, but that is what happened, and the same thing has happened in two other cases that Dr. Dwyer has been called to see by other physicians and has administered the extract. This child recovered rapidly and the mastoid wound was healed at the end of the third week.

Case III.—This is the most remarkable, however, as it shows the cure of a streptococcus capsulatus mucosus bacteremia without operative measures. Jacob P., aged 6 years, was brought to Dr. McKernon's clinic on February 19th, 1913, with the history of pain in the right ear of several days duration, but with no

discharge. The previous history was negative. His father said that he had been having high fever and when seen the temperature was 104°. As there was no vacant bed in the hospital, a paracentesis was performed but no fluid escaped although the membrane was very red and had appeared to bulge. On the following day he was admitted into the hospital with a temperature of 104°. The pain in the ear had subsided and there was no tenderness over the mastoid, nor was there any thickening of the canal walls or other indication for operation except the high septic temperature. His blood count showed 16,000 leucocytes, with 76% polymorphonuclear and 23% monocuclear cells. On the 20th he complained of severe pain in his left shoulder, but this shifted to the right hip and groin on the next day, and Dr. Hutton, the attending physician, was asked to examine him. He reported, "That in the absence of any history it appeared to be a case of inflammatory rheumatism, but that the possibility of periostitis and osteomyelitis were not remote possibilities." Sodium salicylate was given for three days but without any effect. On the 21st, the blood count showed 25,000 leucocytes, with 71% poly. and 29% mononuclear cells. A blood culture was ordered but owing to some error was not taken until the 23rd, at which time the blood count showed 24,000 leucocytes, with 81% poly. and 19% mononuclear cells. On the 22nd a marked endocarditis was discovered affecting the aortic valves. Dr. Phillips saw the case with me, being the only surgeon in the hospital at the time, and advised against any operative measures. I should say that Dr. Rae had seen the case with me on two occasions and had also advised against operating, as we had nothing but the high temperature to indicate involvement of the mastoid. By the 23rd, there was marked thickening around the right groin and Dr. Berg of Mt. Sinai Hospital was called to see him. He found the condition to be a profound sepsis, but advised against any operative procedure at the hip for the time being, at least. On the 24th, our pathologist reported a marked bacteremia, the cultures showing numerous growths of an hemolytic streptococcus, this was later differentiated as the capsulatus mucosus. The leucocyte extract was then given daily in 10 c. c. doses. An improvement was at once noted and there was a daily drop in the temperature, as shown by the chart. On the 27th, the leucocyte count showed 17,500 leucocytes, with 75% poly. and 25% mononuclear cells, this being a most remarkable change, showing the increased resisting power of the blood by the de-

crease in the total leucocytosis as well as the decrease in the polynuclear and the increase in the mononuclear cells, which Prof. Hiss claimed to be the most active bodies in resisting invasion by organisms. On the 28th, after only five days of the use of the extract, a blood culture was found to be absolutely negative, even after 48 hours in the incubator and on four different media. On the 2nd and on the 3rd of March he was given more of the extract, although there was no special indication, it being administered to aid the leucocytes in their efforts in throwing off the results of the profound sepsis which had been present. On March 6th, another blood count and culture were made, and proved that the bacteremia had been overcome without any doubt, the culture being again absolutely negative, and the differential count showing a still further improvement, as follows: leucocytes 13,000, polynuclears 67.5%, mononuclears 31%, and 1.5% transitional forms. With this improvement in the character of the blood, there was a corresponding change in the child himself. The heart murmur had almost disappeared, his appetite was good, he was happy and became a ward favorite with his sunny smile and good nature; but, although all the swelling around the hip and groin had gone, he could not bend the hip to sit up, complaining of severe pain. On March 21st, Dr. Phelps kindly applied a plaster casing around the body and the right thigh, and after another blood culture and count, showed well, (that is, good resistance and negative for bacteria), he was discharged and was taken home. Just what was present in or around the hip no one could say. An X-ray showed nothing and an exploratory puncture was unsuccessful in withdrawing any fluid. This case is remarkable and also unique in that it is the only case on record, so far as I know, of a cure of an actual streptococcus mucosus capsulatus bacteremia without any operative measures having been used. There is no doubt but there would have been a fatal result in this case had it not been for the efficacy of the extract, for no one can appreciate the actual profound sepsis of the patient, except those who watched him from day to day.

It was felt that two of these cases would surely terminate fatally, and the abortion of the pulmonary consolidation in the third was a most unusual and unexpected ending. As the extract was the only remedy used in all three cases, their recovery was surely due solely to its influence. In two other cases of pneumonia, occurring in the practice of other physicians, the attacks were cut short in much the same manner as in the one reported

above, the extract being administered very early in the attack, so that it seems as though its future use, when given early enough, will prove a great blessing. Dr. Dwyer has kindly prepared a record of cases in which the extract has been used in the practice of a large number of physicians, each of whom have sent in their bedside notes with the reports of their cases. He personally saw most of the cases before giving the first dose, and the writer has marvelled at the recovery of many of them after hearing of their original condition. In erysipelas and in true lobar pneumonia it acts, in many cases as though it were a true specific, the relief to the patient being felt very quickly after the first injection. It should not be necessary for me to say that it is not strictly speaking a specific for anything. There is invariably a fall of temperature with a marked improvement of the heart beat. Delirium generally disappears rapidly and the patient tells of his relief and feeling of increased strength from the beginning. During the past year over 1,000 rabbits were used, each giving an average of 30 cc. of the extract. As the average dose has been 10 cc., this will give some idea of how extensively it has been used, and I wish it were possible to read some of the many personal letters that have been sent by the physicians, who have used it in order to give you some idea of what is thought of it by them. Even the Faculty of the College of Physicians and Surgeons, in whose laboratory all of the extract has been prepared, had no idea of the extent to which it has been used or the brilliant results obtained, until after Prof. Hiss's death and Dr. Dwyer was asked to give them a full report of the work that had been done. For years Prof. Hiss bore the entire expense of preparing and furnishing his preparation, for he refused to proclaim his work until clinical results would prove its value. It should be borne in mind that this is not, in any sense, either a vaccine or antitoxin, or specific. It has no connection whatever with any bacteria, but is purely a physiological extract and emulsion of the leucocytes themselves, which, on being injected into the cellular tissues, is taken up into the circulation and furnishes food to the overtaxed and exhausted leucocytes in the body, thus allowing them to renew their fight in overcoming the effects of the toxins and even the living organisms which may be present in the system. The necessary dosage for any one or for all cases cannot, as yet, be given definitely. No two cases ever present exactly the same clinical pictures, so that each case must be a problem in itself and the successful use of the extract will depend upon

an intelligent administration after careful examination of the heart and in many cases upon the correct interpretation of a differential blood count, which will always show the resisting power of the blood. The writer feels that a large number of patients would be greatly helped in their convalescence, if careful blood counts were made frequently and the extract was administered whenever diminished resistance was shown by such counts. One important factor in its favor is that it has never been known to have produced any bad effects; it invariably increases resistance, and even in those patients who have not been saved, the fatal end has been delayed many days. No medicine has ever been put to more severe tests than has this extract, Dr. Dwyer not being called to see the cases, generally, until they were almost in extremis and it was felt that nothing could save them. Now that proof of its great value in most desperate cases is undoubted it is to be hoped that the rationality of its use will be recognized by all, and that the many laboratories connected with our hospitals will take steps to prepare the extract for themselves and so be able to keep a supply constantly on hand to be used, not as a last resort, but to prevent the complete overpowering effects upon the patients of toxins or bacteria and their products, that, with the aid of the extract, he should be able to throw off before his resistance becomes so lowered that nothing can save him. The method of preparation was given in detail by Prof. Hiss in his first paper, that of 1908, and is practically the same at the present date, except that it has been found that it could be put out in twice the original strength without injury to the cellular tissues and for the past two years that has been done.

Dr. Dwyer has kindly prepared the following table:

This series of 39 cases occurring in nasal and aural diseases have been treated with the leucocyte extract:

1. Sinus-thrombosis, without positive blood-culture—eleven, with nine recoveries and two deaths.
2. Sinus-thrombosis with streptococcus in the blood culture—three recoveries and two deaths.
3. Sinus-thrombosis with streptococcus mucosus capsulatus in the blood culture—one, ending in death.
4. Septicaemia:
   (a) Streptococcus mucosus capsulatus—one, ending in recovery.

(b) Streptococcus pyogenes with acute endocarditis—three, and all recovered.

(c) Pneumococcus, with acute middle ear, pneumonia and endocarditis—one case with recovery.

5. Clinical septicaemia with endocarditis, following mastoiditis—three cases with two recoveries.

6. Meningitis:

(a) Serous meningitis—three cases, all recovered.

(b) Purulent meningitis, with the organism demonstrated in the cerebrospinal fluid—three deaths and one recovery.

7. Mastoiditis complicated by pneumonia—three cases, all recovered.

8. Frontal sinusitis, complicated by clinical meningitis—one case with recovery.

9. Streptococcus sore throats—five with quick recovery in each.

This series is limited strictly to aural and nasal diseases and their complications, but in addition to the above we have a whole series of cases of septicemia and such conditions due to infections in other parts of the body, and our results on the whole are just as favorable.

We have besides a series of 148 cases of all kinds of erysipelas and will give the analysis of the results obtained in this series of cases.

STATISTICAL ANALYSIS OF ERYSIPELAS CASES.

Age of Patient.	No. of Cases.	Time of Treatment.		Average Duration of Treatment.	Termination of Cases. Recovery.	Death.
Infants (up to 1 yr.)	12	Early*	5	4 days	3	2
		Late	7	6 days	5	2
Children (1-15 yrs.)	14	Early	5	1.5 days	5	
		Late	9	3 days	9	
Adults (15-50 yrs)	110	Early	44	2.2 days	44	
		Late	66	3.5 days	66	
Over 50 years	12	Early	5	1.5 days	5	
		Late	7	3.7 days	6	1
Total	148	Early	59	2.3 days	57	2
		Late	89	4.05 days	86	3

*Early—Treatment begun within 3 days of appearance of lesion.
Late—Treatment begun later than 3 days after appearance of lesion.

RECAPITULATION.

Total number of cases treated—148; recovered, 143; mortality per cent., 3.39%.
General average duration of treatment—3.18 days.
Number of recoveries under 1 year old—8 out of 12.
Per cent. of recoveries under 1 year old—8 out of 12.
General mortality rate—(all cases) 3.39%.
Mortality among patients over 1 year—.73%. Recoveries 99.27%.

DISCUSSION.

Dr. Dwyer said that in his opinion, we were wandering away from the true way of treating meningitis, which seemed to him to lie along bacteriological and specific anti-sera lines. Certainly every operation in the past, directed to the cure of meningitis by drainage has been a disappointment and this operation is directed along the same lines. Considering the operation itself, there presented to his mind certain grave contra-indications, which may seem secondary in importance but which are important and these are all from the standpoint of the patient as the operation itself is not difficult of performance. The position of the patient adds greatly to the congestion of the already congested meninges, a distinct contra-indication and also the use of ether, which is practically the anesthetic that must be used and which is contra-indicated in such a condition. These are all small points apparently but it is the small points that are the important ones in dealing with such a condition. After all, the only advantage gained is in the relief of pressure, as it is now well known that the area drained is comparatively small, as proved at autopsy. Pressure could just as easily be relieved by lumbar puncture, as proved in the past. The cases that cannot be relieved by lumbar puncture are the ones that cannot be relieved by this operation also, as it is generally an internal hydrocephalus that is produced and the point of obstruction is generally distant from the site of operation. Again, the cases the speaker had seen in which the pressure symptoms were marked and which died in a few days died in spite of the relief of pressure and with very marked symptoms of an acute toxemia of fulminating type and here the toxins were the important factor and not the mechanical pressure. Again we are all familiar with epidemic meningitis cases, in which the cerebrospinal fluid is very turbid, in which the pressure symptoms are marked for days and in which complete recovery takes place after the use of the specific sera without operation. In one case that the speaker recalls, the pressure had been extreme for forty-two days and yet recovery was complete. So we must look beyond the mere relief of pressure alone and direct our energies to the combating of the toxemia by therapeutic measures, such as sera, drugs, etc. During the past winter, we had a series of cases of meningitis due to the streptococcus mucoses capsulatus, in which we had absolutely no pressure symptoms at all and yet all died, without developing any of the symptoms we associate with meningitis. In this class of case therefore, the operation would not help at all. The speaker was fortunate enough to have a case of otitic meningitis recover completely, in which the organism, the streptococcus was isolated from the cerebrospinal fluid. In this case the Hiss Extract of Leucocytes and hexamethylamine were used: the symptoms of pressure were marked for four or five days, but cleared as the spinal fluid cleared. In his opinion therefore, more was to be hoped from the treatment along therapeutic lines than from this operation.

Dr. Samuel J. Kopetzky, of New York City, corroborated Dr. Dwyer's observations concerning the value of Hiss Leucocyte extract in regard to its being absolutely harmless, and also in that it tides the patient over an acute period. It is to be remembered that it is in no sense a

specific or curative agent. He questions the diagnosis in the case of bacteremia, which was called sinus thrombosis, wherein the presence of thrombosis was not demonstrated by further investigation. Referring to Dr. Dwyer's case of sinus thrombosis and endocarditis in which recovery was obtained from the use of the Hiss Leucocyte extract, Kopetzky cited his experience with a similar case which recovered without the use of the Hiss extract. He further called attention to the fact that the evidence presented was not conclusive of the contentions made for the extract, nor was he satisfied with the statistics presented by the reader of the paper or Dr. Dwyer as having proved conclusively the value of the extract over the usual methods of treatment.

Dr. Max A. Goldstein, of St. Louis, Mo., throught that the three cases reported by Dr. Haskin were of far-reaching import. After all, serology does not closely differentiate, in its therapeutic results, the problem of anaphylaxis, whether it deals with leucocyte extract, bacterin, or antitoxin. Dr. Haskin reported cases with lowered vitality, treated with leucocyte extract, with no anaphylaxis whatever. The entire subject of serology should be studied very closely.

Dr. George L. Richards, of Fall River, Mass., asked Dr. Haskin if the leucocyte extract is adaptable to use in small towns and in the smaller hospitals.

Dr. Lee M. Hurd, of New York City, cited two cases in which Dr. Dwyer had administered the leucocyte extract for him. The first was spontaneous osteomyelitis springing from the ethmoid cells, in which the extract had no effort. The second was a case of erysipelas developing seven days after operation, by the Killian method, for orbital abscess and frontal sinus disease. On the seventh day the patient had a chill, with a rise of temperature to 105 degrees F. The extract was used, the temperature fell, and the patient made a prompt recovery.

Dr. Haskin, in closing the discussion, reiterated the fact that every case reported was practically *in extremis* when treatment with the extract was instituted, so that the method had been given the hardest kind of a test. The sinus thrombosis cases had been operated upon, were not doing well, and were treated with the extract. The question of the diagnosis of sinus thrombosis was not involved. The only place where the extract is prepared is the laboratory of the College of Physicians and Surgeons. It is easily obtainable, and will keep in an icebox.

SOME OBSERVATIONS ON INTRA-NASAL SURGERY.

By CHARLES W. RICHARDSON, M. D., Washington, D. C.

During the past few years it has been my observation that the rhinologist is beginning to appreciate the fact that the upper air tract, especially the nasal tract, is not an independent organ of the body, but that it is part of an organism and is influenced pathologically, to a large extent, by disturbances in other organs and systems of the body. Acting upon this gradually increasing impression among rhinologists, members of our specialty are looking, or beginning to look, beyond the nose to determine the cause of and remove the conditions which bring about various diseased activities within the nasal chambers. One is impressed with the increased frequency with which very excellent and timely papers are appearing in the journals bearing upon and elucidating points treating upon this co-relationship of the nasal organ and the bodily condition, evidenced thought, research, and keen study, often with reports of cases bearing upon some important type of inter-relationship. My only excuse for reciting the few words I shall bring to you is that the subject is such an important one that it should be furthered in every way that our feeble insistence can carry it. One is impressed with the decreasing frequency with which intra-nasal operative work is now being done for vaso-motor disturbances of the upper air tract. Some years ago it was the common procedure to cauterize and remove turbinates for this disturbance. I regret to note that, even at the present day, this type of surgery is too much indulged in in efforts to relieve this condition. It has been my experience that this form of nasal disorder, if thoroughly studied from its general aspect, and those conditions which are instrumental in provoking it can be relieved or removed and a moderate degree of simple nasal treatment instituted, in which surgery plays no part, a resolution with permanent return to the normal can be assured.

Only a few months ago I discharged from my care a case exemplifying this condition, upon which a sub-mucous operation for restoration of a deflected septum had been done. The operation, as far as I could see, had been attended with a perfect operative

result, but the patient had never received any benefit so far as his breathing was concerned. The septum was perfectly straight, but the sodden, swollen turbinates filled in all the breathing space. Proper instruction as to diet, exercise and avoidance of overwork and excessive nervous zeal, with mild local treatment, resulted in a rapid improvement and later a complete restoration of the normal lumen of the nasal cavities.

Another type of case which I fear also the rhinologist has too lightly considered in the past is the large group of cases wherein there is more active congestion of the turbinates, with intermittent turgescence of varying degrees. Close inquiry in many of these cases will demonstrate that the disturbance is brought about and maintained by faulty metabolism and auto-intoxication. All methods of local treatment of a surgical character employed to relieve such conditions, independent of a proper appreciation of their general causation, are only attended with temporary relief. It is only through a careful consideration of these cases from the gastro-intestinal aspect and the application of the proper therapeutic treatment along these lines that a permanent resolution can be hoped for and maintained. How often are the middle, and even the inferior, turbinates more or less sacrificed in the attempts to relieve these conditions when the result could have been more certainly, rationally, and for the well being of the patient, more satisfactorily accomplished by properly applied therapeutic measures.

Another series of cases which claim our attention and that are provocative of disturbance within the upper air tract are those produced by errors in diet. It has been my observation that investigation of the diet of patients will often lead us to ascertain the cause of many cases of turgescence of the turbinates and various reflex disturbances in the oral and naso-pharynx. In many such cases we will find the patients are partaking too largely of carbo-hydrate and sugar. Such patients are usually overfed, improperly clad, and do not take the requisite amount of physical exercise. The proper regulation of the diet and due regard to the habits of living will aid us very materially in bringing about restoration to the normal in this class of cases. Besides these cardinal, general conditions cited, there no doubt occur to many of you others that could be brought forward wherein the chemistry of food, the bio-chemic action of various secretions, and the development of toxins within the body excite these deleterious actions directly or indirectly upon—what is

for want of a better term—designated the vaso-motor system of the respiratory tract.

It is only my intention in this short paper, in a general way, to aid in impressing again the important fact that there are many disturbances of the general system which influence the upper air tract from a pathological point of view and the relationship of these to the disturbances noted must be thoroughly weighed before any operative measure is resorted to; otherwise, disappointment may not only be keenly felt by the patient but also by the operator as the result of ill-measured intra-nasal operative efforts.

DISCUSSION.

Dr. O. A. M. McKimmie, of Washington, D. C., wished that Dr. Richardson, who has had such a large operative experience in these cases, had taken up that side of the question. All are agreed as to the importance of systemic treatment in vaso-motor disturbance of the nose, but patients who are given instruction about diet and other hygienic measures do not carry them out. Unless something is done locally they think nothing is being done. Some of the milder procedures which Dr. Richardson condemns may yet be used to advantage. After trying everything else, cauterization, for example, may prove useful. The submucous puncture may be helpful in some cases. He did not advocate spraying as a routine procedure in these cases.

Dr. Christian R. Holmes, of Cincinnati, Ohio, agreed with Dr. McKimmie in wishing that Dr. Richardson had gone more into details. He agreed with Dr. Richardson in the belief that the constitutional side of treatment should not be forgotten, but as a rule he had found it difficult to get patients to carry out directions. For that reason it was necessary to place them in hospitals or sanitariums at least long enough to be taught how to live. He had found that the milder cases, which required no operative interference, as a rule do not do well unless they can be sent to a hospital for ten days or two weeks and their cases thoroughly studied under dietary restrictions. It is only thus that satisfactory results can be obtained.

Dr. E. Fletcher Ingals, of Chicago, emphasized the importance of constitutional measures, or of looking after the patient's general health rather than relying upon local or operative measures. He agreed with Dr. McKimmie concerning the value of linear cauterization for the reduction of intumescence of the intranasal tissues. It will not produce a cure in all cases. To secure the best results it is important that a single cauterization be made through the whole length of the turbinated body at one time, and that it be not repeated on the same side in less than three weeks. It is also important that this cauterization be done with the galvano-cautery rather than with acids. Those who have condemned cauterization should revise their opinions.

Dr. H. Holbrook Curtis, of New York City, referred to the use of the *bacillus bulgaricus* in the class of cases in which the alimentary canal plays so important a part. He had often found the result marvellous. Spraying the nose with the pure culture of the bacillus in veal broth, and the administration of the same internally, will relieve many turgescent conditions in the nose. In ozena and rhinitis sicca he was still using the *bacillus bulgaricus* in suspension and considered it the most efficient treatment.

Dr. Richardson, in closing the discussion, said the utilization of local procedures should be a part of the treatment whenever indicated; if none is necessary, then only the general treatment should be employed. If it is expedient to cauterize, this should be done, but never to an extreme degree. The patient must be watched with reference to clothing, habits of life, etc., beginning, as suggested by Dr. Ballenger, by looking at the feet.

REPORT OF A CASE OF NASAL POLYPI INVOLVING THE ORBIT, FRONTAL SINUS, AND ANTERIOR FOSSA OF THE SKULL.

By WILLIAM B. CHAMBERLIN, M. D., Cleveland, O.

The following case is unique in my own experience. In a rather careful review of the literature I have been unable to find any similar condition described. I therefore venture to report it more or less fully.

Wm. G., age 41, was referred to me on Oct. 18, 1912, on account of a discharging sinus beneath the left eyebrow. The history which he gave was as follows: Several years before masses of polypi had been removed from both sides of the nose, affording him relief from the nasal obstruction of which he had complained. After a time this obstruction again became marked and three months before consulting me he first noticed a discharge from beneath the left eyebrow. There was no history of pain and the trouble had not prevented him from performing his daily work, that of laborer in a steel mill.

Examination revealed a rather pronounced exophthalmos of the left eye, considerable swelling of the soft parts above it and a fistula immediately beneath the centre of the eyebrow. Through this fistula there discharged a thin, grayish, yellow pus. A probe introduced into the fistula revealed some denuded bone and passed into what was apparently an unusually large frontal sinus. Both nasal fossæ were completely filled with polypi. Inasmuch as the patient was otherwise in good health and had experienced no great discomfort from the trouble in question an attempt was made to free the left fossa under cocaine anesthesia at the office. Enormous masses of polypi, as well as a portion of the ethmoid labyrinth, were removed. It was not possible, however, to remove all of the polypi, on account of the bleeding which obscured the field. The patient returned to his home and was not seen until the third day following the operation, when he reported a fair degree of breathing space on the left side. The drainage through the nose, however, had not caused any decrease in the swelling above the eye.

Four days after the first operation he was sent to Lakeside Hospital for operation under general anesthesia. X-ray plates were made upon his admission, in both the lateral and antero-

posterior planes. These plates gave a distinct shadow extending from the median line to the lateral skull wall and from the anterior wall to a line passing just in front of the external auditory meatus, apparently filling most, if not all, of the anterior fossa of the skull.

A Killian operation had been contemplated, but on account of the condition shown in the radiographs, it was decided to open the skull cavity through the frontal sinus, and to rely upon the findings as a guide to further operative procedure. A curvilinear incision through the eyebrow was made and carried down to the bone. Skin and periosteum were then reflected upward as far as possible. On removing a portion of the anterior sinus wall, above the inner canthus a plate of bone was encountered

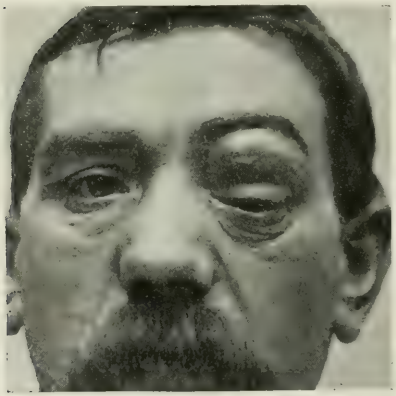


Figure 1.

Figure 2.

Before operation.

lying free and quite movable. This proved to be the posterior wall of the sinus and was removed as a sequestrum. Masses of tissue resembling the convolutions of the brain immediately bulged through the opening. There was no pulsation however, while the color was that of the ordinary nasal polyp. To afford greater working space a vertical incision, joining the first incision at right angles, was carried upward for 4 cm., while the anterior cranial wall was resected over an elliptical area 3 x 5 cm. Not knowing where the dura might be encountered or what its condition would be, the tumor mass was removed very carefully, piecemeal, with broad blunt forceps. The mass removed appeared to be the ordinary nasal polypi and measured fully ¼ litre in amount. The only point of origin within the skull cavity was

a pedicle fully one cm. in diameter, and situated at about the centre of the internal or median wall. When this was severed there was some bleeding, but this soon stopped without ligation. After the mass had been entirely removed a cavity was disclosed, lined with smooth walls and apparently coextensive with the anterior fossa of the skull. The forefinger introduced into the cranial opening failed to reach its posterior boundary.

Attention was now directed to the orbital roof, which was removed wherever necrosed bone was discovered. A large sized curet was then readily passed through what was evidently the fronto-nasal duct and masses of polypi removed from it. After curetting, this passage was about 1½ cm. in diameter and seemed ample for drainage. On account of the length of the operation,

Figure 3. After operation.

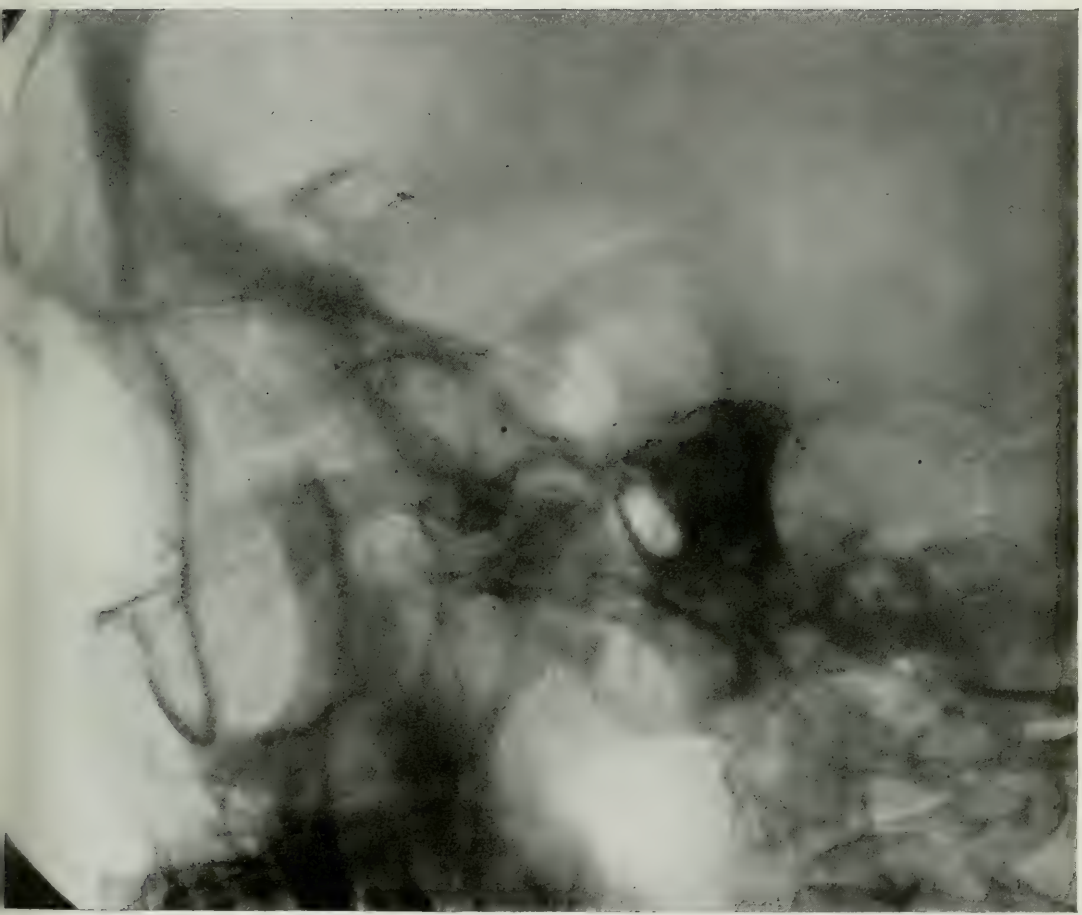
about 1½ hours, and the condition of the patient, which was not very favorable, it seemed best to reserve any further operative interference for a subsequent time. The wound was therefore packed with gauze and a wick carried through the enlarged fronto-nasal duct into the nose. After the usual outer dressing the patient was returned to the ward in good condition. Recovery, with the exception of delirium tremens, which developed on the second day and continued for 48 hours, was uneventful and the patient left the hospital at the end of one week. The eyeground was examined by Dr. W. E. Bruner, who found nothing abnormal. There was apparently no ill effect from the sudden relief of the intracranial pressure. Dr. Ruh, the resident pathologist, who examined portions of the mass removed, reported them to be mucous polypi.

Up to Dec. 23, the patient reported at the office three times weekly for dressings. The external opening had gradually grown smaller until there was a union of the outer skin with the inner epithelium, leaving an opening about one cm. in diameter. No attempt was made to close this as the drainage through the nose has not been entirely free. At first gauze was carried through the fronto-nasal opening into the nose, but rubber tubing about ¾ cm. was soon substituted for the gauze. On Jan. 1st the patient returned to his work, reporting once a week for dressing and examination, the other dressings being done by his family physician. On Dec. 4th, enormous masses of polypi, together with most of the middle turbinate and ethmoid labyrinth had been removed from the right fossa, and on Feb. 1st more polypi and part of the middle turbinate from the left fossa.

The orbital sinus continued to discharge for a time after the patient left the hospital, but finally closed and has remained firmly healed up to the present. The patient is now in the best of health and has worked steadily every day. Advantage was taken of an enforced vacation in attempting to render the nasal drainage more free by the use of Sullivan's rasps. This is now fairly free but not sufficiently so that the closure of the external opening can be considered safe. It may be necessary to have him return to the hospital and secure nasal drainage by the typical Killian method. When the nasal drainage is unobstructed the external opening can be easily closed with safety to the patient.

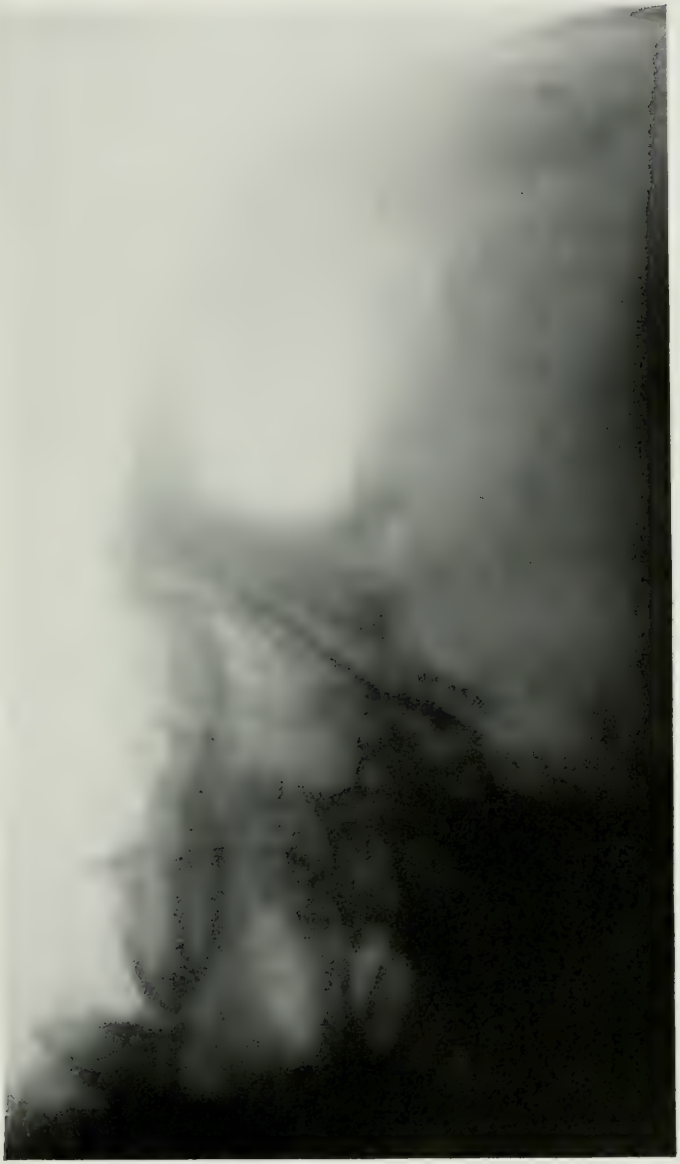
There are several points of interest in regard to this case. The first is the entire absence of symptoms following compression of so large a brain mass. There was no history of headache or paralysis while the mentality seemed good. The second is the presence of polypi in this situation. Mucous polypi in the frontal sinus are of course common, but their encroachment upon the cranial contents is most unusual. The absence of infection is striking. The third point of interest is the ultimate outcome. Will this cavity fill with granulations and so become obliterated or will it persist? My own belief is that it will remain practically the same size that it is at present. Through the anterior opening a good view has been constantly obtainable by means of a large sized aural speculum. The walls are smooth and though there has been some pushing forward of the posterior wall this has been too gradual to make the complete obliteration of the cavity seem probable. The distance from the outer surface to the pos-

BEFORE OPERATION.



BEFORE OPERATION.

AT PRESENT TIME.



AT PRESENT TIME.

terior wall, as measured by the probe is now 5 cm.; while the distance to the extreme posterior external angle measures 7 cm.

DISCUSSION.

Dr. Thomas H. Halsted, of Syracuse, N. Y., said that this case emphasized the importance and the necessity of a radiographic examination of all frontal sinus cases prior to operation, and that it illustrated the possible extent to which disease of this sinus might progress without producing cerebral symptoms even with the posterior plate gone.

He congratulated Dr. Chamberlin on his management of the case.

Dr. Ross Hall Skillern, of Philadelphia, thought there must have been a pre-existing mucocele of the frontal sinus, and at the same time, perhaps, a hyperplastic ethmoiditis. Polyps, as is well known, always grow in the line of least resistance. In Dr. Chamberlin's case there were probably dehiscences in the lamina papyracea and frontal bone, which a growing mucocele would cause. He had always seen a portion of the orbital wall lacking in operations for mucocele. The mucocele might have broken through into the eye, and the mucous polyp might have grown through this break into the anterior cerebral fossa against the frontal lobe, continuing to develop until the entire fossa was filled. If the growth had been thoroughly outlined, instead of being taken out piecemeal with forceps, it would have been possible to make a diagnosis.

Dr. John M. Ingersoll, of Cleveland, Ohio, said he entered the operating room while Dr. Chamberlin was operating upon this patient. He thought the X-ray plate a faulty one at first, and was surprised to see what the actual condition was. He had watched the case with a great deal of interest. The remarkable absence of symptoms must have been due to very gradual development of the polypi and to consequent gradual development of pressure upon the brain. Referring to Dr. Skillern's suggestion with reference to uncovering the entire cavity, the speaker said this would have entailed the loss of nearly half of the skull anteriorly.

Dr. Chamberlin, in closing the discussion, emphasized the point of origin of the mass. Upon sagittal suture no point of origin whatever could be found. How to close the cavity was a problem. After removal of all the bony tissue the scalp might have been allowed to prolapse down over the cavity, but this would leave a frightful deformity. It would have been better to get sufficient drainage through the nose. It was possible to get a catheter or probe through the nasofrontal duct at present, but the opening was not large enough to allow free drainage at all times. Until free drainage through this passage could be secured the anterior opening could not be closed.

THE RELATION OF NASAL CONDITIONS TO ANAPHYLAXIS AND ASTHMA.

By JUSTUS MATTHEWS, M. D., Mayo Clinic, Rochester, Minn.

Anaphylaxis is one of the most fruitful and interesting fields of research to which the attention of medical scientists has been directed during the past decade. In it have been found explanations, not only of certain phases of immunity and hypersusceptibility to infections, but also of various diseases and symptoms, such as asthma, hay-fever, serum disease, urticaria, etc. We have thus been enabled to group and study logically by animal experimentation these conditions in ways that promise still greater revelations for the future.

Although observations of anaphylactic reactions had been made previously, no very extensive systematic experimentation was recorded until after the Theobald Smith[1] phenomenon was reported in 1903. Immediately following this, researches by Roseneau and Anderson[2], Otto[3], and others, began to yield results truly startling in their relation to many common clinical problems.

The serum disease was among the first of the phases of anaphylaxis to be carefully studied as to its etiology, symptomatology and pathology. The blood or serum of many animals, when introduced parenterally into the blood or tissues of certain other species of animals, is more or less toxic. But men, rabbits, guinea-pigs and other species receive horse serum without reaction, except in the cases of individuals having the state of hypersusceptibility called allergy or anaphylaxis. The reception of the initial dose of serum by an animal not previously sensitized may or may not induce symptoms. The absorption of the second dose of the same serum will, under favorable circumstances, produce changed or allergic reaction.

It has been found subsequently that a great variety of protein substances will produce the anaphylactic reaction, but that symptoms of reaction are essentially the same in animals of the same species no matter what antigen be used. An animal sensitized to a certain protein may react to certain other proteins, but the maximum of reaction occurs only when the proteins of both the sensitizing and toxic doses are taken from the same or closely

related species of plant or animal. The condition of anaphylaxis may be either congenital or acquired. Inherited anaphylaxis is found in a portion of the off-spring of sensitized females.

Acquired anaphylaxis may be either active or passive. Active anaphylaxis is produced by the parenteral absorption of a foreign protein, and requires an incubation period of 6 to 21 days. Passive anaphylaxis occurs only when artificially produced by the injection of the blood or serum of a sensitized animal into another animal of the same or another species. It requires an incubation period of only one day at most and may be immediate.

After hypersusceptibility has been established it persists throughout life, but probably diminishes slowly and constantly after its maximum at about 21 days. A condition of anti-anaphylaxis usually follows recovery from acute anaphylactic shock, but it is a transient phase and disappears after a length of time proportionate to the violence of the reaction.

Reaction to the toxic dose of antigen may be immediate or delayed. Immediate anaphylactic reaction or shock exhibits a variety of symptoms of which the most important is dyspnea, which may become extreme and end in death from asphyxia. It was at first assumed from inconclusive experiments by Gay[4], Southard[5], and others that the dyspnea was caused by an emphysematous condition of the lungs and that this was due to violent contraction of the diaphragm under control of the central nervous system upon the respiratory centers of which the antigen acted. The more recent experiments of Auer and Lewis[6] have, however, demonstrated conclusively that both of these hypotheses were errors. Distention of the lungs persists after their removal from the thoracic cavity, indicating that the emphysema is an effect and not the cause of the distention. Moreover, by various ingenious methods of recording at the same time the variation of intrathoracic pressure and the flow of air to and from the lungs during anaphylactic shock, they discovered that although the former were equal to or greater than normal, yet no air entered or left the lungs which remained in a state of extreme distention. This was found to be due to tonic contraction of the muscular coat of the bronchioles which prevented the escape of air from the alveoli. Section of the lungs of animals dead of anaphylactic shock are dry, showing that neither pulmonary edema nor hypersecretion of viscid mucus necessarily plays an important part in the occlusion of the alveoli or bronchioles.

The solution of the question as to whether the phenomena of shock depended on the central or peripheral action of the antigen was equally conclusive. Section of both vagi had no effect on the character or severity of anaphylactic shock, whether the antigen was injected immediately after the section or after an interval of time sufficient to allow complete atrophy of the peripheral nerves. The use of curarin for the same purpose was also lacking in effect, although the superficial varied somewhat on account of the necessary use of artificial respiration. Likewise, in a pithed animal also under artificial respiration the toxic dose was followed in from 1 to 3 minutes by gradual decrease of respiratory oscillations until the rhythmic blast could force no more air into the distended alveoli from which tonic contraction of the bronchioles prevented its escape. Thus it appears that the reaction may and probably does normally occur without the assistance of the nervous system. The demonstration by Schultz[7] that pieces of smooth muscle from a sensitized animal would contract far more upon contact with the specific antigen than would similar pieces taken from normal animals, supports the view that shock may be produced by direct action upon the muscles of the bronchioles.

Under certain conditions animals may be sensitized by the taking of an antigen into the stomach as guinea pigs become sensitized by the feeding of raw horse flesh and give characteristic anaphylactic reaction to the serum or other tissues of the horse.

The individuals who suffer violent gastro-intestinal and sometimes respiratory disturbances on taking certain articles of food are undoubtedly subject to the same reaction. This is caused by the absorption into the blood and lymph channels of a protein which has not been sufficiently digested to lose its identity and which thus becomes an antigen capable of the same action as though introduced parenterally into the blood or tissues.

Guinea pigs become sensitized to the horse by confinement in the same room, through the inhalation of emanations, and it seems probable that the individuals who are sensitive to the horse, cat, or other animal have received their sensitization in the same way. The majority of the deaths following the therapeutic injection of horse serum have occurred in persons subject to horse fever and asthma or in those sensitized by previous injections. The symptoms in these cases, while exactly typical of anaphylactic shock, are those of an extreme asthma resulting in asphyxia and death. Hay-fever, rose cold and similar affections occur in

those individuals whose membranes are hypersensitive to specific varieties of pollen and their reactions are analogous to and undoubtedly identical with the local reaction of experimental anaphylaxis. The asthma often associated with the local symptoms of hay-fever, etc., is induced by the entrance of the same antigen into the blood or tissues, usually through the mucous membranes of the upper respiratory tract, and is the typical respiratory disturbance of acute non-fatal anaphylactic shock. Clinically, asthma produced by these known foreign proteins differs in no respect from the more common form of the disease known as spasmodic or bronchial asthma except that in the latter the identity of the foreign protein causing the reaction is unrecognized.

Susceptibility to anaphylaxis has been observed to vary greatly in individuals, families, and varieties of guinea-pigs. The so-called asthmatic tendency has in a similar way long been known to be marked in certain persons and families, and heredity has undoubtedly an important bearing on the etiology of the disease. It has been assumed that this predisposition was inherent in the nervous system and this may be so in some cases but there is no proof of this assumption, whereas it has frequently been observed that individuals, supposedly subject to heredity, have very evident etiologic factors in nasal polypi, suppurating sinuses, etc., the removal of which has relieved the asthma. From this it would appear that the essential inheritance has been an anatomic or functional predisposition to affections of the upper respiratory tract probably associated with a susceptibility to anaphylactic sensitization. This makes it especially important to favor in every possible way the development of the upper respiratory tracts in the children who might be expected to inherit this tendency.

Osler[8] states that diseases of the lungs are rarely if ever the cause of asthma, and the fact that emphysema and bronchial lesions are commonly associated with asthma of long standing while they are rarely if ever seen in early cases favors the belief that these conditions are end-results and not causes of asthma. However, it is not improbable that severe chronic bronchitis, especially if associated with bronchiectasis, whether or not the result of asthma, may, in certain cases, furnish a site for the retention and reabsorption of mucous secretions. The cures obtained by treatment with the bronchoscope in a series of such cases after all other means had failed as described by Horn[9], Freudenthal[10], and others, would seem to prove this hypothesis.

An interesting case illustrating some of these points was that of a young girl who suffered violent symptoms of anaphylaxis on contact with wheat flour. In early childhood she had fallen head foremost into a partly filled barrel of flour, had been nearly strangled, and probably absorbed undigested proteins from it through the mucous membrane of some portion of her respiratory tract. Since that occurrence any dust of flour in the air has occasioned severe hay-fever and asthma, and the eating of incompletely cooked wheat flour has sometimes caused violent gastro-intestinal as well as respiratory disturbances. Urticaria has often followed these attacks. The recurrence of the vasomotor rhinitis occasioned by the contact of flour has gradually resulted in chronic edematous rhinitis and ethmoiditis with polypoid degeneration of the nasal mucous membrane of the region. During the past winter she has had asthma without the agency of flour and evidently caused by the pathologic condition of the nose since it ceased promptly on the correction of the local lesions.

The development of chronic rhinitis and sinusitis in cases of recurring hay-fever is a logical sequence and has been commented on by many writers. Asthma likewise is a frequent accompaniment of hay-fever and will usually be found to correspond in time and severity of occurrence with the pathologic changes in the nasal structures. At first it occurs only on exposure to contact with the specific external irritant, which causes the hay-fever, but later develops a tendency to recur without this contact. Therefore it is evident that there has developed another substance capable of acting as an antigen and, since the changed conditions of the nose and nasal sinuses furnish a new factor in the retained and autolosysed mucous secretions, it seems reasonable to look on this as the probable cause of symptoms.

Pus and mucus, in some instances sterile and in others infected, were aspirated from the antra of asthmatic and non-asthmatic patients and used by Sanford (Mayo Clinic) as antigen in a series of experiments on guinea pigs. The initial dose was received in each instance without symptoms and the reaction to the toxic dose was uniformly the typical shock ending in death. This proves that mucus or pus either infected or sterile, is capable of acting as antigen and that the products of bacteria are not essential in producing either sensitization or shock. Further experiments are being carried out, the results of which would have a more im-

portant bearing on the subject of this paper and which I had hoped to report at this time. But failure to obtain a sufficient amount of proper material to give conclusive results makes it necessary to delay the report.

During the past four years there have been examined in the Mayo Clinic about 300 cases of asthma which I will not report in detail as the series differs only in numbers and the smaller percentage of operative treatment from that previously reported. In over 90 per cent. of the cases the principal lesions which might be considered as etiologic were in the upper respiratory tract. Chronic suppuration or the retention of mucoid secretions in the nose or accessory sinuses occurred in the majority of these cases. Treatment was directed toward the object of securing free and continuous drainage of every portion of the tract and little attention was paid to possible reflex factors of etiology. In the majority of the cases the relief of the asthma corresponded almost exactly with the degree of success in obtaining the result sought, that is, the prevention of the retention and reabsorption of mucous secretions. The relief of asthma by any known treatment does not mean that the patient is permanently cured, since the susceptibility remains through life and symptoms will recur whenever there exist conditions favorable to the production and absorption of the specific antigen to which the individual is sensitive.

Various methods of desensitizing animals have been discovered but no method yet reported gives a lasting immunity and all are attended by high mortality. Until a safe and efficient method of desensitization is possible the treatment of asthma must be directed, as in the past, to the relief of symptoms by whatever measures are indicated in each individual case.

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HISTOLOGIC PATHOLOGY OF THE ACCESSORY SINUSES.

By Dr. JOSEPH C. BECK, Chicago, Illinois.

In presenting this subject, it is the purpose of the writer to illustrate histologic specimens of tissues removed from cases operated upon for the relief of chronic sinusitis and to draw some practical conclusions as to the etiology and treatment of these affections. It is intended to bring out most prominently the minute pathology in cases of chronic sinusitis suppurative and non-suppurative, in which the symptoms of asthma were prominent.

The work is based upon the examination of a large number of specimens from 140 cases operated upon for chronic sinusitis and typical specimens have been selected for this publication. The clinical data or histories, course and final outcome of these cases, would aid a great deal in this report, but for lack of time and space, they will be omitted. Suffice it to say that the study of minute pathology has brought a wealth of information to the writer and the study of these specimens in connection with the clinical phase of the subject alone, is of considerable practical value.

In the study of microscopic specimens of middle turbinates and ethmoid curetments of the cases of asthma, whether in suppurative or non-suppurative cases, it has been noted that the bone changes are quite uniform in showing the formation of large areas of rarefaction. (Fig. 7, 15 and 16). However we have very little evidence of inflammatory processes about these rarefied areas.

The tissue covering the bone, however, shows pathologically considerable variation. In some cases, there is a great deal of inflammatory edema, with very little inflammation and round cell infiltration. (Fig. 3). In others, the round cell infiltration and old connective tissue predominates, (Fig. 4 and 6) while in still other cases the glands are distended and increased in number, (Fig. 2 and 3) or the glandular structures have undergone a myxomatous degeneration. (Fig. 3). The epithelium varies considerably in its structure; at times it is very markedly thickened

columnar, (Fig. 14) as well as stratified. (Fig. 13). Cilia very seldom can be discerned and in some cases there are areas where the epithelium is entirely wanting.

In regard to the microscopic examination of cysts in the middle turbinates, they resemble considerably the changes as mentioned above except that the lining epithelium of the cavity and the subepithelial structure appear to have characteristic differentiation. The epithelial cells are arranged in regular columns with nuclei at the base. The basement membrane is very thick and appears to form the endosteum of the cysts. The contents of the cysts is homogeneous in character. (Fig. 8).

In the chronic non-suppurative forms of sinusitis, where the symptom of asthma was not present, the minute pathology appears to differ in the one main point, in that the rarefying osteal changes is not as prominent; and the writer wishes to call attention to this for the purpose of throwing some probable light on the etiology of the asthmatic symptom. The structure covering the bone has about the same type of change as in the asthma cases; that is, the absence of the round cell infiltration.

The inflammatory edema and secondary myxomatous change are very frequently found at the expense of degenerative changes of the mucous glands. In many of the sections one can make out the beginning of polypus formation. Of course, there are quite a number of sections encountered in which a mixture of inflammatory as well as non-inflammatory changes is found, as will be shown in connection with the description of the suppurative type of chronic sinusitis.

In reference to hay fever, it has been argued by many that the sinuses are perhaps the seat of pathologic change and treatment directed to them has been reported of value, especially the removal of middle turbinates and curetage of the ethmoid, also washing out and treatment of the cavities, as the antrum, frontal and sphenoid. In operating on a number of these cases and examining the tissues histologically, I have found nothing markedly changed in the middle turbinates. The mucous glands seemed perhaps to be in the state of hypertrophy. (Fig. 5). Of course, the operations were always done long after or preceding an attack.

In regard to the chronic sinusitis of the suppurative form, we find that the principal change in the early stages, is that of marked round cell infiltration, especially in the subepithelial structure, (Fig. 12) and the glands appear to be distended in areas, while, in others destroyed by the inflammatory change. The

epithelium is very frequently thickened and inspissated with pus. (Fig. 12 A) and the bone is seldom changed.

Later, however, the connective tissue fibrosis is found quite prominent and in many instances the bone is also infiltrated with round cells. (Fig. 12 B). If the process has been of long standing, areas of necrosis in the bone will often be found especially in curetted portions of the ethmoid. (Fig. 12 C). In connection with this necrotic process distant areas of granulation tissue are encountered and in some instances, necrotic bone in the form of small sequestra.

In regard to the lining of the cavities, as the antrum, frontals and sphenoids, there is found in the long protracted cases, a marked thickening with no evidence of any glandular structures and many areas of myxomatous degeneration; (Fig. 12 D) again a great deal of round cell infiltration and a thin layer of flattened epithelium. (Fig. 12 E). This latter condition, is, however, not constant for at times the epithelium is markedly thickened. (Fig. 12 F). The importance of the epithelium, however, is self-evident, in that its presence prevents spontaneous obliteration of the cavities and its complete eradication is necessary in operative procedures in order to obtain this result.

In reference to the surgical pathology of polypi, we have found the most frequent condition to be a fibrosis with areas of myxomatous degeneration and inflammatory edema. The round cells are not very prominent except near the surface. (Fig. 12 G). The epithelium covering the polypi will depend on whether there is present pus or secondary recurrence after operative procedures. In the latter condition, the epithelium is markedly thickened; (Fig. 12 I) in massive polypi, which are crowded within the nares, also in the multi-form polyiposes, in which the nares are distended by polypi, the epithelium covering is thick; (Fig. 12 H). As to solitary polypi, especially those of the sphenoid, we have noted a cyst formation, (Fig. 12 I). These cysts are not at all uncommon in the polypi of the non-suppurative form of sinusitis.

In assuming that atrophic rhinitis belongs to the group of sinus involvement, either primary or secondary, we find the pathologic changes in the middle turbinal to be as follows:

In the early stages the bone has many areas of rarefaction. The soft structure shows areas of marked degeneration in the glands and the epithelium covering the turbinal exhibits early tendencies to metaplasia or hornification. (Fig. 1).

Later, the bone shows a disposition to shrink, due to the preponderance of fibrous connective tissue. The glands are all practically destroyed and the epithelium has still greater metaplastic change with many areas of denudation. (Fig. 10). Similar changes are found in the curretted portions of the ethmoid in atrophic rhinitis.

Conclusions.

First: The pathologic changes found in the middle turbinates and curetted portions of the ethmoid in asthma cases and in non-suppurative sinusitis, are very striking in that the bone shows rarefaction somewhat resembling that found in early bony changes of osteomalacia, acromegalia and otosclerosis. This pathologic finding is suggestive of a possible etiologic factor in some disturbances of the poly glandular system or the glands of internal secretion.

Second: In the non-suppurative sinusitis, the conspicuous absence of inflammatory elements, as the round cell infiltration and the presence of inflammatory edema or myxomatous degeneration at the expense of loss of glandular structure, is very apparent.

Third: In the suppurative forms of sinusitis, the great prevalence of round cell infiltration with tendencies to necrosis and granulation formation is very characteristic.

Fourth: The lining of the larger sinuses, antrum, frontal and sphenoid in the markedly protracted suppurative types is so changed as to preclude resolution and no matter how well these cavities may be drained or ventilated, their obliteration or eradication cannot be brought about unless the entire epithelal lining is destroyed.

Fifth: The pathological characteristic of both suppurative and non-suppurative forms of sinusitis are very frequently met with in combination in the same case.

Sixth: The great similarity in the changes of atrophic rhinitis in the early stages and of non-suppurative sinusitis, especially in the bone, would suggest a similar etiologic factor in the disturbances of the glands of internal secretion, as mentioned in first conclusion.

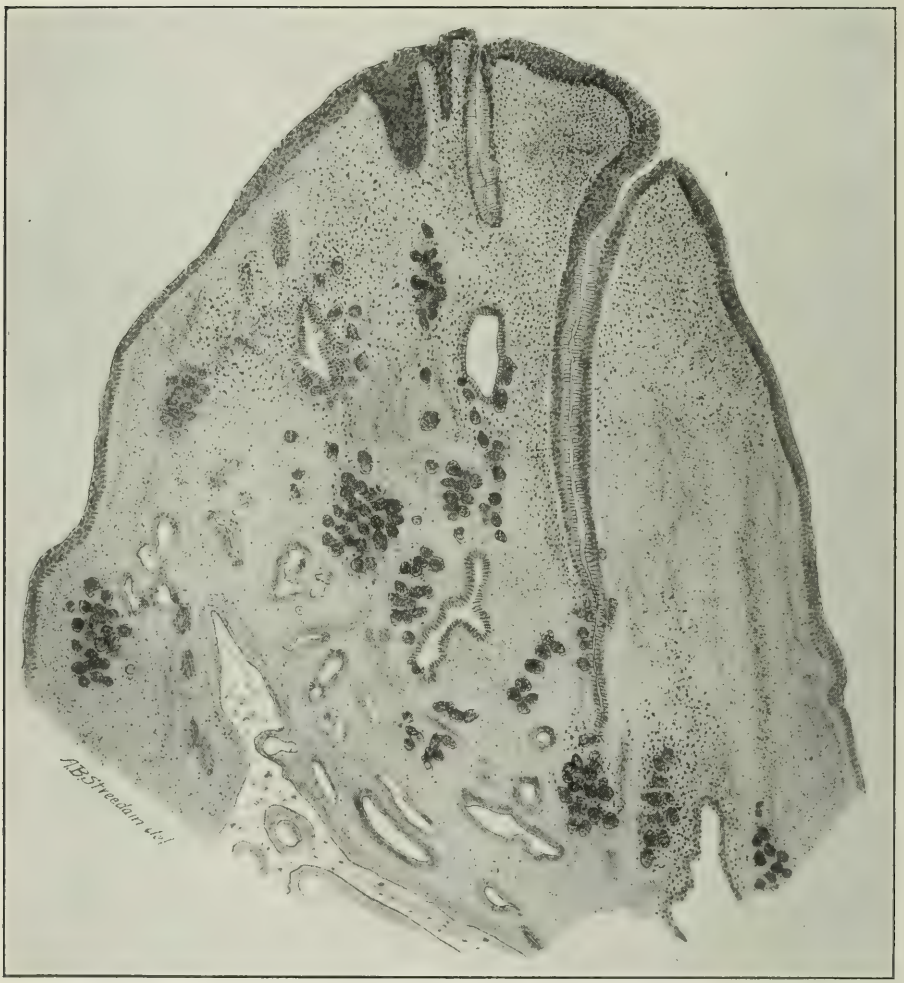


Figure 1. Middle Turbinate. Atrophic Rhinitis.

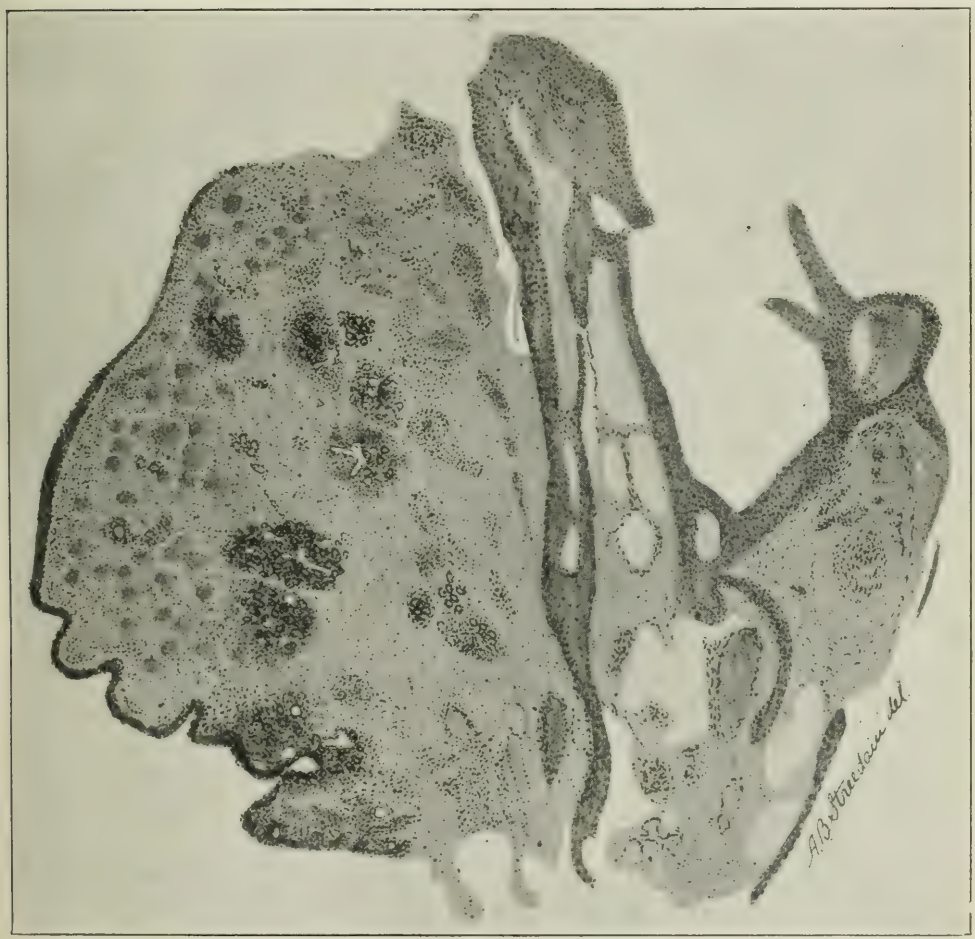


Figure 2. Middle Turbinate. Non-Suppurative Sinusitis (Asthma).

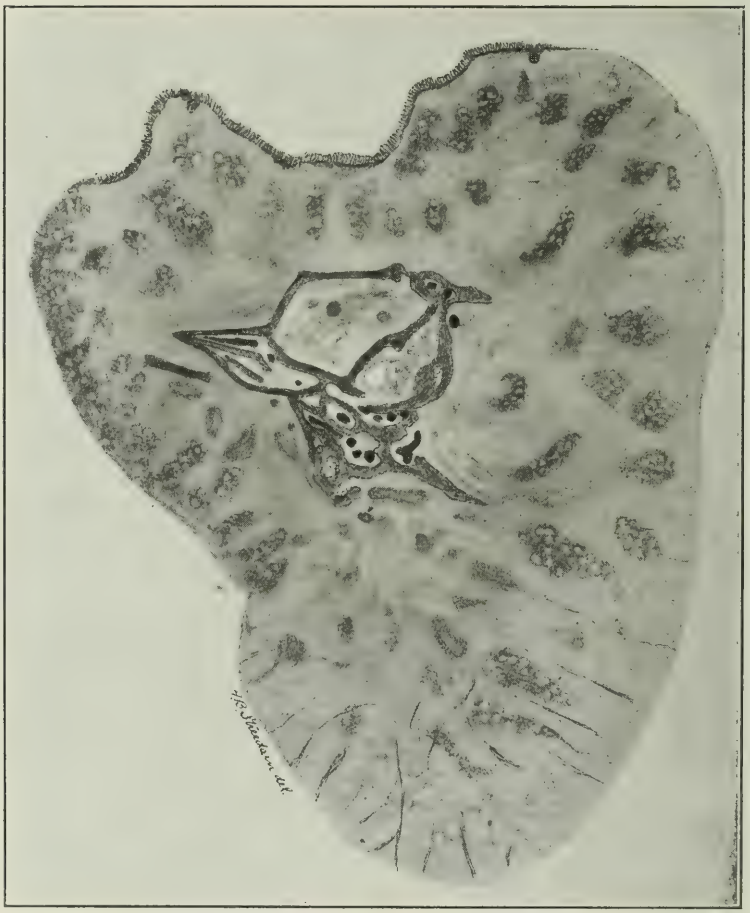


Figure 3. Middle Turbinate. Non-Suppurative Sinusitis (Asthma).

Figure 4. Middle Turbinate. Non-Suppurative Sinusitis. (Asthma.)

Figure 5. Middle Turbinate. Hay Fever. (Asthma.)

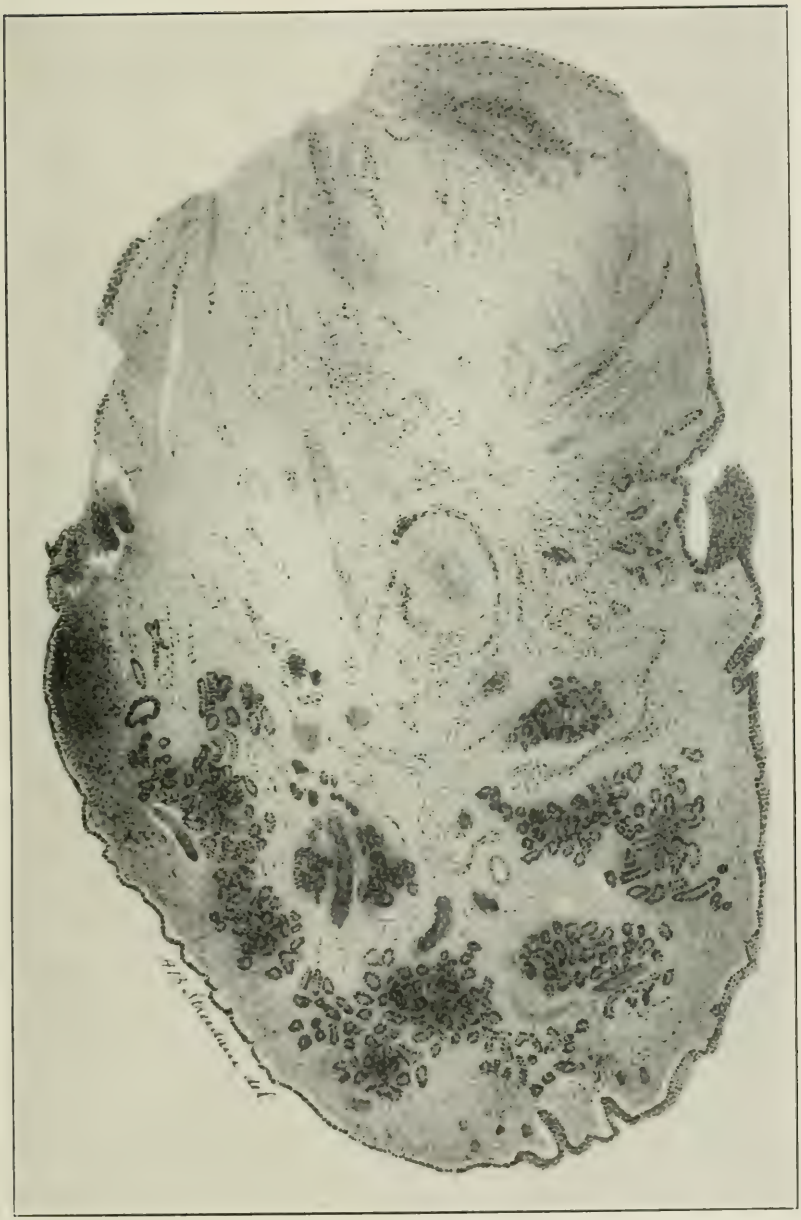


Figure 6. Middle Turbinate. Non-Suppurative Sinusitis. (Aspirin.)

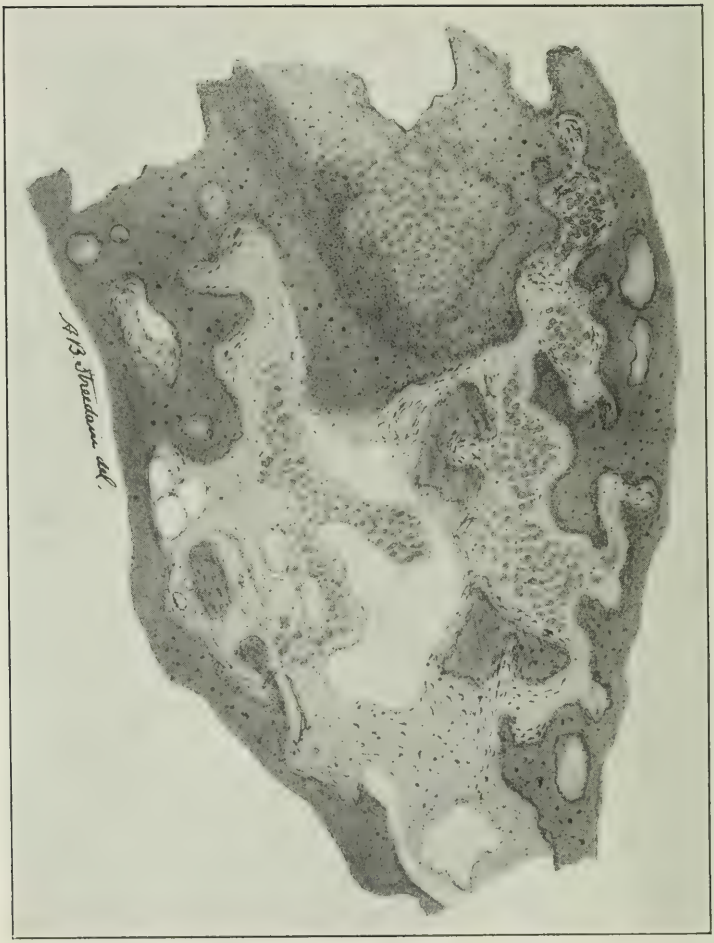
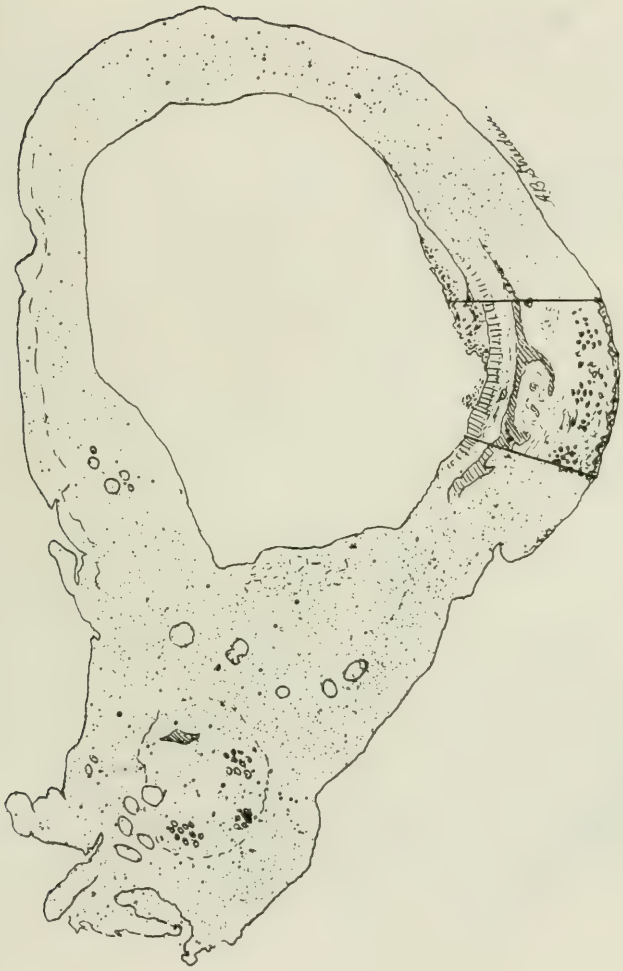


Figure 7. Middle Turbinate. Non-Suppurative. (Asthma.)



Key to Figure 8.

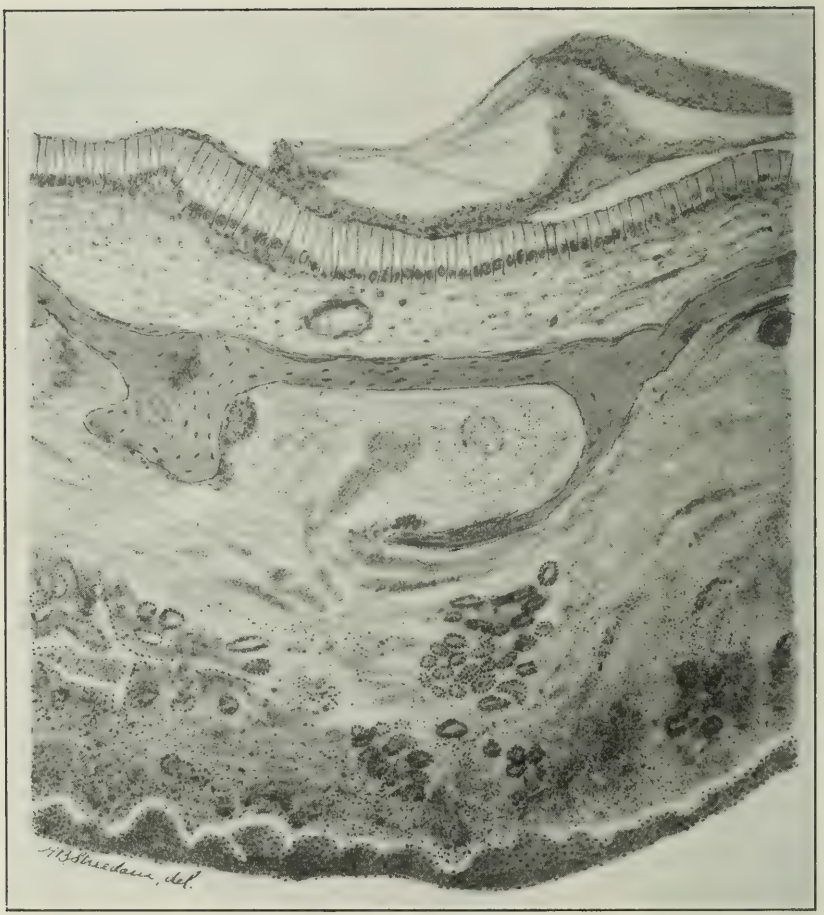


Figure 8 Middle Turbinate. Cystic Formation. Non-Suppurative Sinusitis. (Asthma.)

Key to Figure 10.

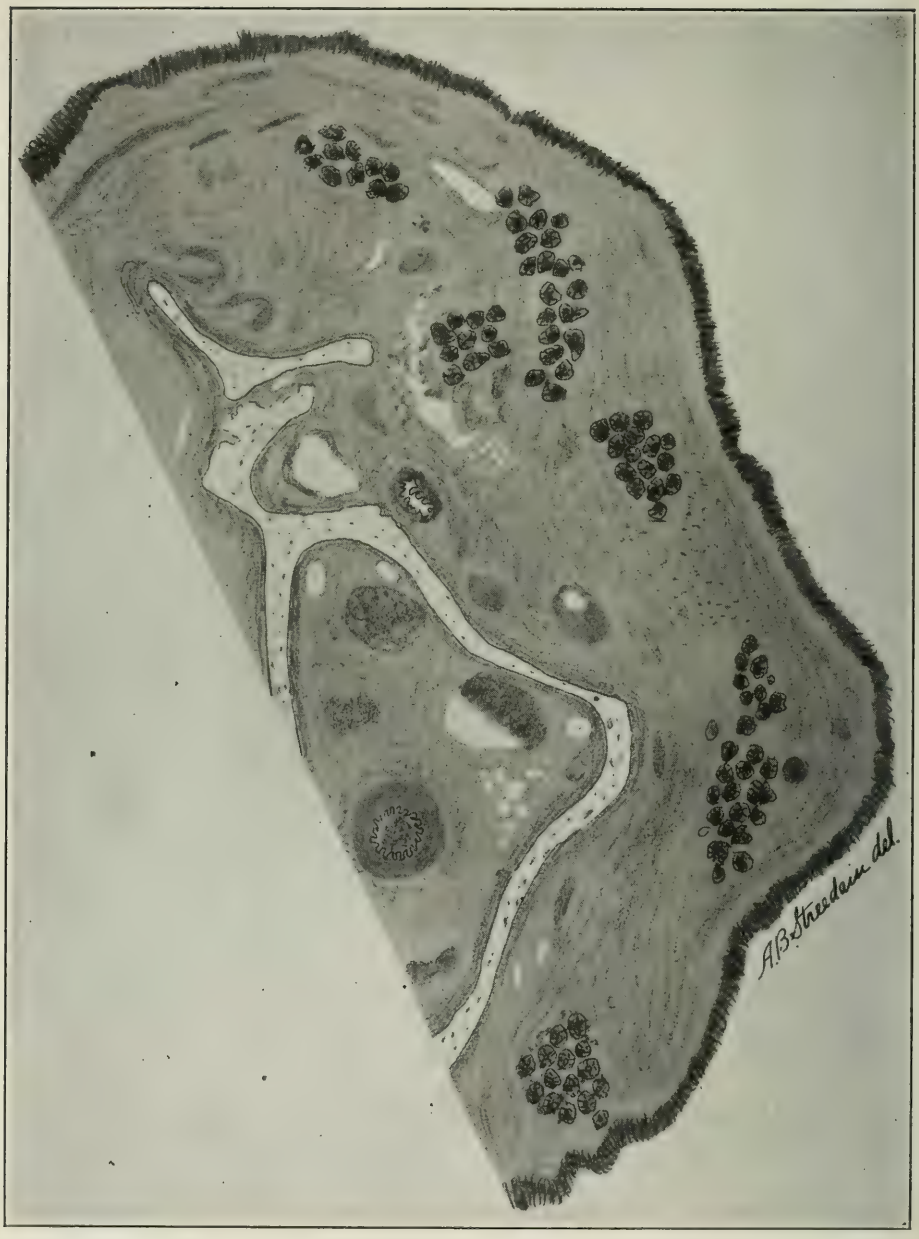


Figure 10. Middle Turbinate. Atrophic Rhinitis. (Late Stage.)

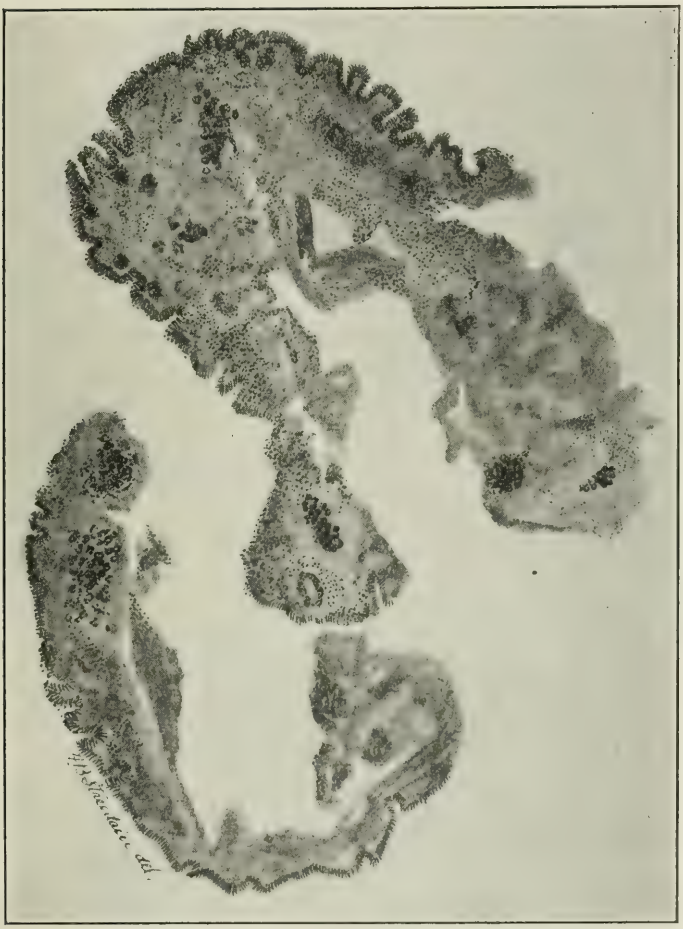


Figure 12. Ethmoid Cells. Chronic Suppurative Sinusitis. (Asthma.)

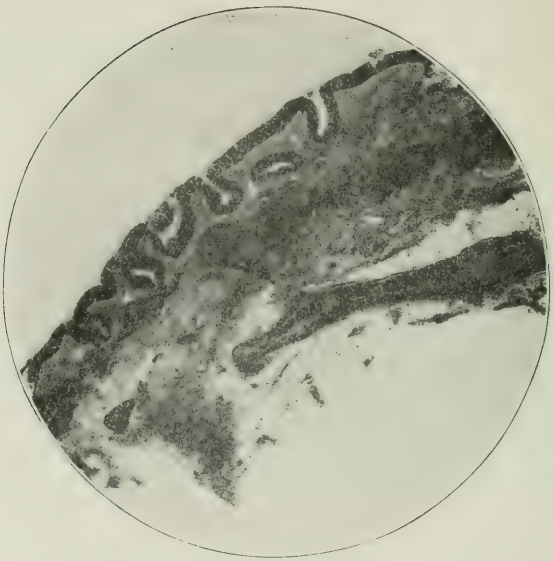


Figure 12 A. Ethmoid Curetments or Partitions in Chronic Suppurations.

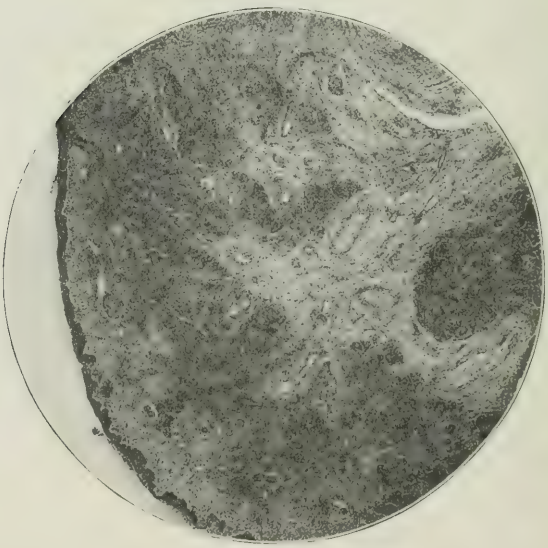


Figure 12 B. Middle Turbinate in Chronic Suppuration.

Figure 12 C Ethmoid Curetment. Chronic Suppurative Sinus Disease.

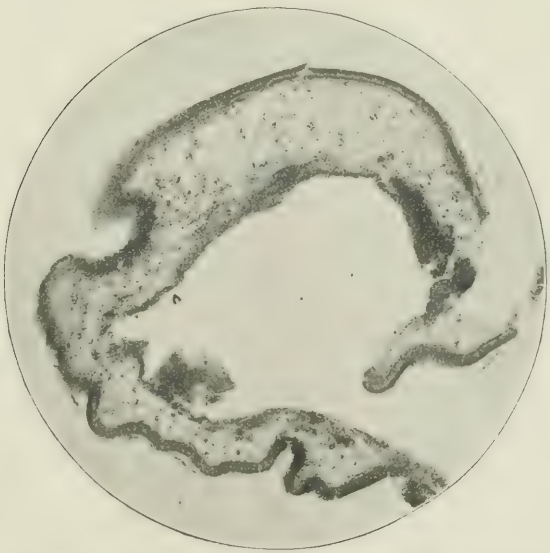


Figure 12 D. Lining of Frontal Sinus. Chronic Suppuration.

Figure 12 E. Lining of Antrum. Chronic Suppuration.

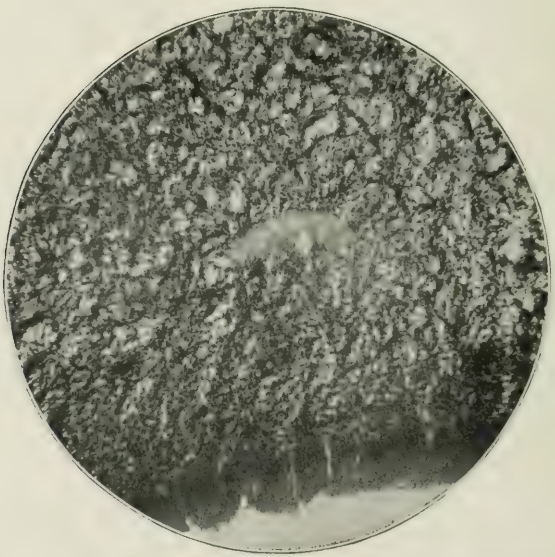


Figure 12 F. Lining of Frontal Sinus. Chronic Suppuration.

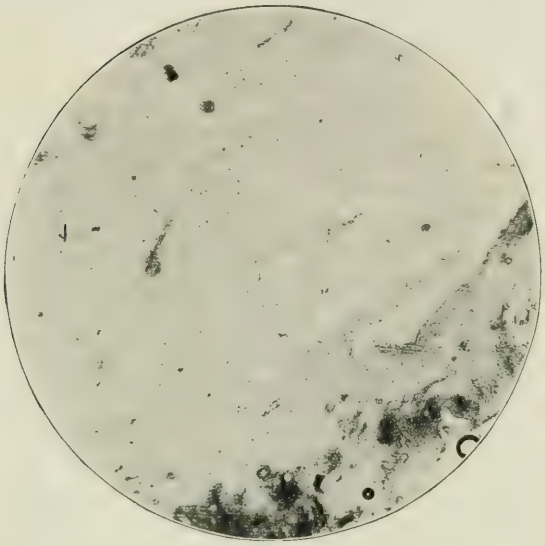


Figure 12 G. Typical Nasal Polyp Fibro-Myxomatous.

Figure 12 H. Fibrous Nasal Polyp Crowded Within Nares.

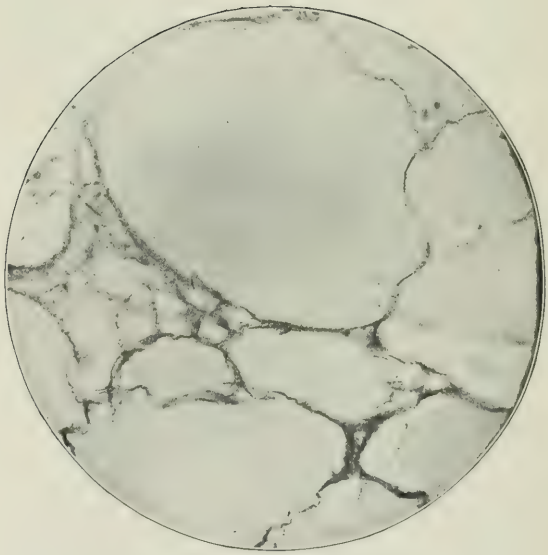


Figure 12 I. Solitary Nasal Polyp Cyst Formation.

Figure 13. Middle Turbinate. Chronic Non-Suppurative Sinusitis. (Asthma.) A on Key.

Figure 14. Middle Turbinate. Chronic Non-Suppurative Sinusitis. (Asthma) B on Key.

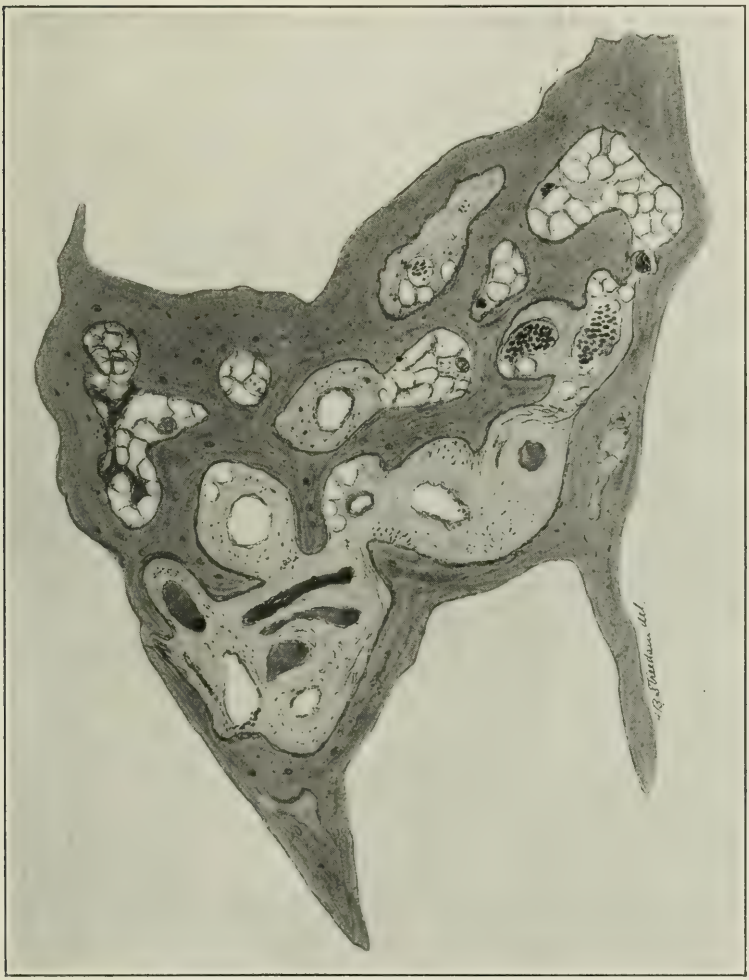
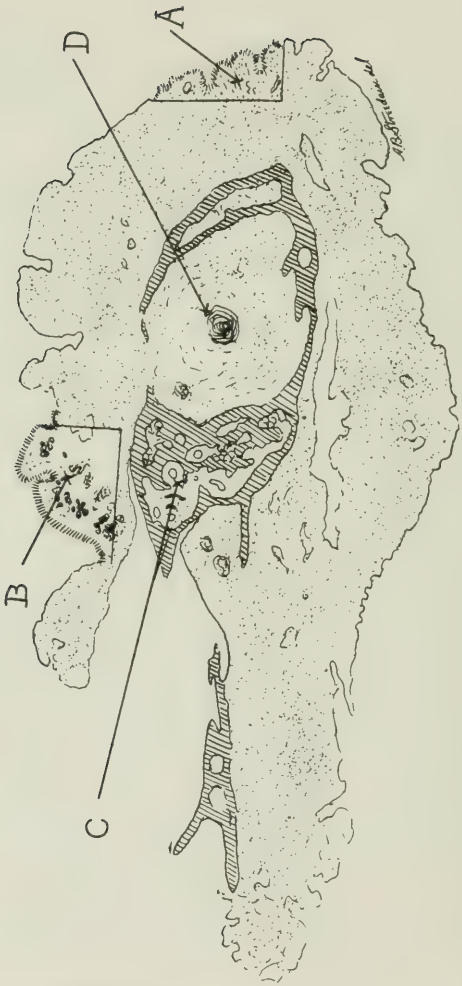


Figure 15. Middle Turbinate. Chronic Non-Suppurative. (Asthma.) C on Key.



Key to Figures 13, 14, 15, 16.

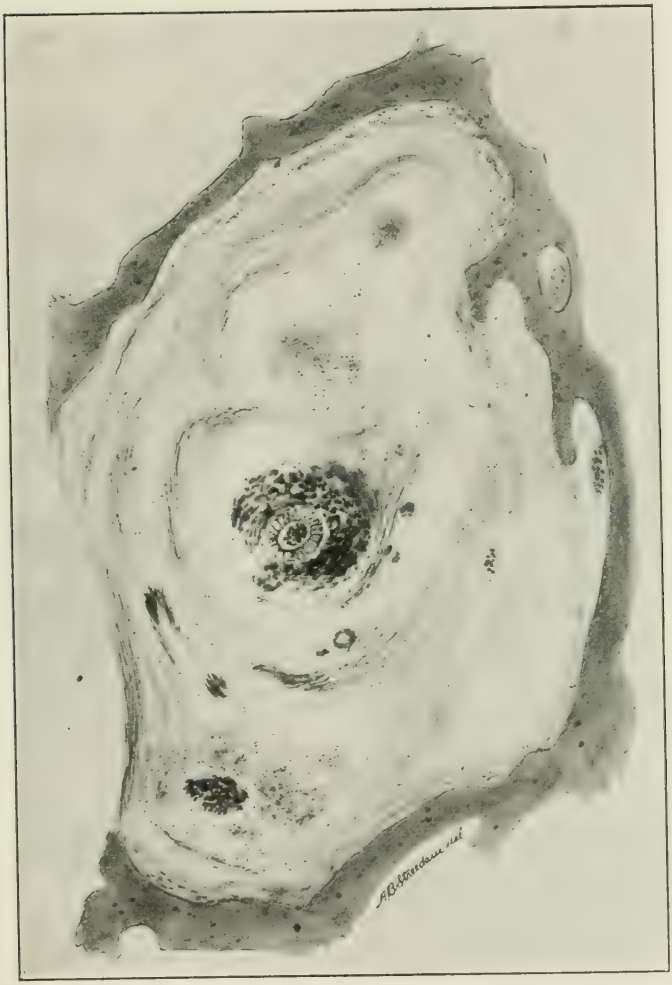


Figure 16. Middle Turbinate. Chronic Non-Suppurative Sinusitis (Asthma.) Doan Key.

DISCUSSION.

Dr. J. A. Stucky, of Lexington, Ky., thought the last word had not yet been said with reference to the origin of asthma, whether it be nasal or otherwise. He believed less and less in the need for local treatment. Of course, if pressure from the turbinate bodies resulted in the absence of free drainage, this pressure must be removed. The most important part of the treatment of asthma, however, is systemic. He had seen good results from the use of thyroid extract, five to ten grains administered three times a day until there is slight acceleration of pulse. Local treatment with adrenalin and cocain did more harm than good.

Referring to Dr. Beck's paper, he wished someone would explain the cause of the edema in the sinuses and middle turbinates. Is it the result of local or systemic irritation; in other words, irritation from within or from without the body?

Dr. William H. Haskin, of New York City, thought Dr. Stucky's remarks very much to the point. Operative treatment was seldom necessary. For fifteen years he had been employing suction in these cases, and had yet to see a case in which operation was necessary, except for the removal of middle turbinate bones or other obstructions to drainage. By going in under the turbinates and pulling out the secretion by means of the suction apparatus, the mucous membrane would shrink in a short time. When the thick, glairy mucous, which sometimes comes off in a sheet, had been removed, it was possible to use any kind of local treatment. He had found nitrate of silver very useful. Vaccine therapy was of value, but failure often resulted because the true infected secretion was not reached in taking the smear from the nose. Staphylococcus infection was present in the majority of instances, and if an autogenous vaccine be made from this astonishing results could be obtained. He had found this to be true in a series of forty or fifty cases. In connection with atrophic rhinitis reference was made to a paper by Cobb and Nagel. The bacillus mucosus ozenae, first described by Abel, was always found in atrophic rhinitis. These observers also showed that unless one removes the scabs and gets into the crypts of the membrane, the bacillus in question will rarely be found. They are not in the scabs. Cobb and Nagel reported a series of more than seventy cases, with favorable results from treatment with vaccines. Birkett and Meekin reported seven cases in which, after treatment with vaccine, the secretion from the nose was found to be sterile, but remained profuse. The only way to remove the secretion in such cases is by suction, and then treatment of the bared membrane.

Dr. Matthews agreed with Dr. Stucky that one must look as much to the general as to the local treatment of hay fever and asthma. In most cases, especially of asthma, the general conditions might predispose to rhinitis, but not be the immediate cause of asthma. If the secretions could be removed by the method suggested by Dr. Haskin, or by any other, relief and possible prevention of asthma would be obtained. The importance of having a clean, draining mucous membrane was emphasized.

Dr. Ross Hall Skillern, of Philadelphia, emphasized the fact that certain forms of ethmoiditis, especially the hyperplastic variety, cause asthma. Noting Dr. Beck's allusion to "necrosing ethmoiditis," he called attention to the use of the term by Woakes, of London, thirty years ago, being assailed at the time by his colleagues. The speaker had never been able to find necrosing ethmoiditis, if by this is meant a putrefactive condition, without suppuration. He had seen a rarefying condition, but in no specimen had he ever seen necrosis. The changes in the mucosa in sinus disease did not depend so much, apparently, upon the chronicity, or time, but upon drainage, virulence

of the organism present, and necrosis. If drainage is good the changes are not so marked. If the organism is particularly virulent the infection will progress to necrosis. Necrosis of the bone will bring about changes in the mucosa. Dr. Beck did not mention the metamorphosis of cylindrical into squamous epithelium, which has been shown to take place in chronic cases. The presence of squamous epithelium signifies that the disease has been progressing for some time.

Dr. Beck, in closing the discussion, called Dr. Stucky's attention to the necessity of differentiating between edema and infiltration. Edema, such as he had shown in some of the sections, is a systemic condition, whereas infiltration is ethmoiditis, as criticised by Dr. Skillern, when applied to cases in which there is suppuration. With reference to ozena, the cross section did not show any pockets ,as referred by Dr. Haskin, the secretion coming from within the turbinate bone. The Abel bacillus can be found in the mouth and elsewhere. He would not operate extra-nasally in asthma of nasal origin.

ATROPHIC RHINITIS WITH OZENA. ITS ETIOLOGY AND SURGICAL TREATMENT.

By FRANCIS P. EMERSON, M. D., Boston, Mass.

Introduction.

From the discussion of Atrophic Rhinitis with Ozena, as found in the literature, it is evident that special investigators are particularly interested in two methods of procedure in the study of the cause and treatment of this disease.

First, in an attempt to isolate a specific organism and establish a method of treatment based on such findings, and second, in looking upon the symptom complex as due to pus producing organisms, causing multiple foci that are amenable to the recognized surgical principles of drainage and cleanliness.

The difficulties encountered by an investigation along the first procedure are due to the results of decomposition and secondary infection, which give rise to an innumerable bacterial flora and interferes with an attempt to determine which particular one is the active organism in the disease.

Renewed interest has been awakened of late by the work of Abel and his experiments with the bacillus mucosus ozena. This painstaking work has led others to attempt to substantiate his claims, an excellent article, among others appeared last year in this country, by Cobb and Nagle. This phase of the subject has already in previous years engaged the attention of members of the profession, notably Löwenberg, Pesand, Gradenigo, Dreyfuss, Loeb, Ambi, Brindell, Gruenwald, Hajek, Marano, Abel and others, but without any definite results.

In the second method of procedure, where the symptom complex is considered as due to an attenuated infection with multiple foci, secondary to a pan-sinusitis, this would suggest that the original infection is not followed by an essential or primary atrophic process, acting as an intermediate step, but that the sinuses are invaded directly by a pus producing organism. While it is conceivable that fetor and crusting might be produced by the breaking down of soft tissue, bone necrosis and defective drainage, with the resulting secondary infection, yet we know that certain pus producing organisms by themselves are capable of causing a thin,

others a thick secretion, and still others may cause fetor and crusting. In this sense a specific organism might be necessary to produce ozena, but not necessarily have, as its primary manifestation, an atrophic tissue change. If we accept the latter view, which the writer believes is true, we can with advantage continue to search for a specific organism and at the same time, perfect our surgical technic, because purulent retention within nonelastic walls requires free drainage, as a prerequisite to cure, whatever the infective agent might be.

Theories.

From the earliest medical records to the present time, many theories have been advanced as to the etiology of ozena, but none of them have had a considerable following, among men of eminence. For a review of this literature, you are referred to the excellent article by Sendziak in the annals of Otology, Rhinology and Laryngology for 1907.

That tuberculosis and syphilis cause a certain number of cases is conceded, but the researches of Sobernheim, Eisenbohr and Alexander by the aid of the Wasserman test, showed that syphilis, the disease most suspected as a cause of ozena, was responsible for only a relatively small percentage.

Bosworth's theory of a preceding purulent rhinitis, with no sinus involvement as a cause of ozena in later life, has been questioned by the researches of Pearce at the Boston City Hospital and of Pearce and Winne at the Albany Bender Laboratory, who showed conclusively, that the sinuses are often invaded by a pus producing organism in the course of the infectious diseases as early as the second year. Is it not also the experience of all rhinologists, with their present better knowledge of sinus infections, that a primary purulent rhinitis is a thing of the past? It is always secondary to some focus of infection in the epipharynx or hollow spaces.

Theories based on the shape of the face, as being a cause are less often referred to today with our more definite pathology on which to base a diagnosis.

The Herd theory of a sinus disease as a cause of ozena, has had such able exponents as Gruenwald, Hajek, Loehnberg, Michel and not a few among the members of this society, although this theory has not been generally accepted; yet the writer brings this phase of a much discussed subject before you today again, because of

his belief that the rapid advance in our knowledge of and ability to cure sinus diseases, has opened new possibilities in the study of the etiology and cure of ozena, even granting a specific organism. In the past, when treating these focal troubles intra-nasally, even if we agreed as to its etiology, yet our knowledge of the surgical technic of sinus disease has advanced sufficiently to make it possible to adopt a common method of thorough exenteration of involved cells. This would in turn lead us to some definite agreement for or against a focal infection, as being the chief underlying cause of this disgusting affection.

Personal Work.

It is for this purpose that I venture to offer the results of the following surgical procedure, after briefly stating the grounds, which in my opinion implicate the accessory sinuses, without there being a true atrophic process.

First. The writer has never seen a case of a so-called atrophic rhinitis, that was not relieved by thorough drainage, instead of being made worse, as would be the case, if trauma and increased air space were added to a genuine atrophic mucosa.

Second. The crust formation and fetor when unilateral, are always on the wide side, where they have apparently been preceded by a compensatory hypertrophy of the second turbinate, due to the deviated septum. This enlarged turbinate would in turn interfere with the proper drainage of a subsequent sinus infection.

Third. The discharge of pus over a mucus surface, in a long standing case, is in the writer's experience always accompanied by a glazed appearance of the mucosa, dryness and an exudate, a low grade catarrhal process, and not a true atrophic process. That this is not a true atrophy is shown by the return of function of the mucus surface with the establishment of free drainage and the cure of the underlying focal infection. This is often seen on the posterior pharyngeal wall in cases of chronic sinusitis of the sphenoid cavity, or posterior ethmoid cells.

Fourth. Radical surgery with the object of establishing free drainage, lessens the tendency to crust formation, instead of increasing it. The lessening of crust formation is in proportion to the thoroughness with which the affected cells are drained. This is followed by a purulent or muco-purulent discharge, until the diseased surface is made healthy, by topical applications and cleanliness. Nowhere in the body does nature tolerate so much

abuse as in the nasal chambers, providing we leave free exit for the secretions.

Fifth. Ethmoid disease, the writer believes to be the most constant of the infectious processes in the nasal chambers. As a suppurative ethmoiditis it is easily recognized. On the other hand, there are inflammatory processes of the ethmoid cells which are less active or where the drainage is better, in which case, they are characterized by serous infiltrations, dilatation of the capillaries, with the mucus membrane dry and red; and if seen after the process has been going on a certain length of time, there is found covering the mucus surface an exudate which is made up of dead epithelium, pus mucous and blood. These seem to be the steps and the macroscopic appearance clinically of a certain type of catarrhal ethmoiditis. This type of an inflammatory process, where it fails to undergo resolution, passes into a chronic condition, which the writer has repeatedly noticed spoken of as atrophic rhinitis. Since these cases of so-called atrophic rhinitis get well under improved drainage, the question would therefore arise, whether the clinical term of "Atrophic Rhinitis" is a misnomer or the pathological understanding of atrophy is incorrect. To the writer it is inconceivable that a true atrophy with destruction of the glandular elements and an increase in the connective tissue stroma, should resume its function clinically, as is the case of the mucus membranes of the nasal chambers, where a free exit for the secretions is provided. Such cases untreated may continue indefinitely, but when the ostia become obstructed by inflammatory changes, and drainage is interfered with, a subsequent active infection may take place resulting in a suppurative ethmoiditis.

Sixth. The general systematic symptoms, such as pallor, loss of weight, muscular weakness, gastric and other symptoms are a sequel rather than a predisposing cause of the local condition. These symptoms are found to improve with diminished absorption, as the local condition is relieved.

Seventh. The writer's cases of ozena have shown the morbid process more uniformly to be in the ethmoid and sphenoid sinuses. Next in frequency have been the ethmoid, sphenoid and frontal, and last ethmoid, sphenoid and antrum.

The preceding observations were further strengthened by the classical work of Gruenwald on nasal suppuration and the report of cases by Michel, Löehnberg, Hajek, Mayer, Beck, Theissen and others. In the beginning of this work, the cases were tedious and necessarily difficult to cure, owing to the haphazard way individual

cells were attacked at that time and their proneness to relapse with re-infection, yet the results during the last four years have grown increasingly more satisfactory with added experience and a better technic. I wish to emphasize right here that the successful results in the treatment of these cases of so-called atrophic rhinitis with ozena depends absolutely upon the careful after treatment, which is fully as important, as the thorough surgical exenteration. Regular and painstaking care must be exercised until all the affected surface is brought into a healthy condition; and even then for a long time we have a membrane with low vitality, easily re-infected and functionally disturbed.

General Description of Cases.

The clinical cases fall into two general classes, one the typical cases of Fraenkel with crusting, fetor, anosmia, necrosis and sloughing of the soft tissue, and second the atypical cases in which fetor and crusting may be absent and where the diagnosis of attenuated sinus infection might be more an open question. Contrary to the established facts in the treatment of disease, the older the stage of this disease, the easier it is to cure. This is in perfect harmony with the sinus theory of the etiology of ozena; owing to the fact that in the third stage, where the infection is less active, the ostia open and the drainage more or less perfect, due to the necrosis and the sloughing of the soft tissue, there is left a smooth bony surface, and therefore the cure is relatively easy.

In the second stage, although earlier in the disease, with the mucus membrane boggy, drainage blocked, and the entire surface covered with a thick firm crust, the problem is increasingly difficult.

The element of fetor has not seemed to the writer to indicate that a case would present any additional obstacle to healing, for the reason that the odor may be due to a particular organism, not necessarily more virulent or more intractable to overcome than those with little or no odor. In fact the only serious problem is an anatomical one. In those cases where the cells are developed in the floor of the frontal sinus or out over the orbit, it is obvious, that drainage must be obtained by extra-nasal methods. If we assume that drainage is essential, then we must admit that a certain per cent. of cases of ozena, presenting these anatomical peculiarities, cannot be cured by any intra-nasal procedures, whether these are along medical or surgical lines. These variations in development have been pointed out by Shambaugh in an excellent

article entitled: "The Construction of the Ethmoid Labyrinth," in the Annals of Otology, Rhinology and Laryngology, Vol. 16, 1907.

We approach our surgical procedure then with the understanding that,

First. For anatomical reasons all cases cannot be cured intranasally.

Second. That when functionally cured the previously infected surface is prone to relapse, due to re-infection.

Third. That only constant attention to drainage, the removal of polypi, topical applications and cleanliness following radical exenteration will avail in any case. Given these conditions the writer believes that as large a percentage of cases of ozena can be brought to a successful issue as we could expect to cure intranasally, cases of undoubted pan-sinusitis.

Surgical Technic.

The first step consists in anesthetizing the patient in a reclining position. He is then placed in a chair and the nasal mucosa is adrenalized. The sphenoidal opening is next located with a probe and if not easily accessible, part of the second turbinate is removed, in order that we may take away enough of the anterior sphenoidal wall, so that the enlarged sphenoid opening can easily be recognized, when the landmarks have been removed. Next the method of Mosher is employed to systematically exenterate under direct vision the ethmoid labyrinth. With the head tipped back the agger nasi-cell is located a little above and in front of the attachment of the second turbinal, corresponding to the rounded eminence on the outer nasal wall. This is found with a curette, by first feeling for the hard surface of the superior maxillary process and then working toward its posterior margin until you break through the thin outer wall of the cell, which corresponds to a large cavity lying at the floor of the naso-frontal duct. It is now important to bring the head forward, so that it is at right angles to the body. The curette is then turned so that it faces the nares, away from the orbit. With a lateral to and fro motion the inner cell walls and partitions can with a little practice be easily broken down by the sense of touch, back to the posterior ethmoid cell. The point here which the writer wishes to emphasize is, that the curette is not to be used to remove the lining membrane, but as an instrument to break down the bony parti-

tions and nasal wall of the cells. This leaves the second turbinate turned down and attached by a narrow base which can be wholly removed by the nasal scissors or forceps in a few minutes. We next pack the operative field with strips of gauze wet in a solution of adrenalin 1/3000. We can now work on the opposite side, where our original operative procedure is duplicated and the field tamponed. The gauze in the first side is then removed, the enlarged sphenoidal opening sought, and its remaining anterior wall is then removed up to the posterior ethmoid cell. The field is then gone over by introducing the little finger into the nares in order that we may detect any irregular bony projections or margins of cells that may interfere with drainage. All granulations and polypi should be removed without destroying the entire mucus lining. The patient is then returned to bed without any nasal packing.

After Treatment.

First, mechanically remove all crusts gently to avoid bleeding. If the drainage is good after the first week or ten days, these will cease to form and the discharge will have become muco-purulent.

Second, after the first week remove all polypi, that may appear. These will tend to return for several weeks.

Third, use the Bier Suction Apparatus after the first washing out the sphenoid cavity with a canula. Watch especially the sphenoid opening at its margin where it tends to granulate in rapidly and obstruct drainage, as pointed out by Hajek. Touch the margin with silver nitrate, or trichloracetic acid, until it remains permanently open as the result of cicatrization.

Fourth, make the surface dry by gentle pressure and after the first week apply a 4 to 8 per cent solution of silver nitrate, especially to the sphenoid cavity itself and over all unhealthy areas wherever found.

Fifth, if the patients live at any distance, allow an alkaline wash to be sniffed twice daily, from the hand or a table spoon. The surplus water should then be blown from the nares without taking hold of the nose on account of the danger of back pressure in the eustachian tubes.

Sixth, do not allow a water spray of any kind to be used. For four weeks the patient should be seen two or three times a week, then for four weeks more once a week, and after that at irregular intervals until discharged. Remember to caution the patient that an acute infection will bring on a relapse which should be

attended to at once. This usually means only a few treatments, after the acute infection subsides.

General Summary.

The interest of the profession in the etiology of ozena seems from the literature to be centered upon two methods of procedure.

First, in an attempt to isolate a specific organism, and second, in looking upon the symptom complex as due to pus producing organisms, causing multiple foci.

The difficulty in isolating a specific organism, arises from the innumerable bacterial flora, resulting from decomposition and secondary infection.

The second procedure does not admit an essential or primary atrophy as an intermediate step in the disease.

Theoretically, a specific pus producing organism might cause fetor and crusting, without a true atrophic process.

That tuberculosis and syphilis are the underlying cause of ozena, except in a small per cent. of cases is not probable.

Bosworth's theory of a preceding purulent rhinitis in infancy without a sinus infection is questioned. The post-mortem reports of Pearce and Winne show sinus involvement as early as the second year in the course of the infectious diseases.

More definite pathology has led to the abandonment of many former etiological theories. The rapid advance in our knowledge of and ability to cure accessory sinus disease makes it now possible to adopt a more uniform surgical technic for their exenteration. This should show more definitely the relationship of sinus affections to ozena.

What seems to be an atrophic process is always improved by drainage.

Summary Concluded.

A sinusitis frequently develops in the following manner. A septal deviation is followed by a compensatory hypertrophy of the second turbinate with a resulting catarrhal ethmoiditis. This hypertrophy and catarrhal inflammation so interferes with drainage that a subsequent infection by a pus producing organism makes a sinusitis probable.

A chronic catarrhal inflammation accompanied by an exudate is frequently spoken of as an atrophic process. The return of function with improved drainage shows that is is not a true

atrophy. Radical surgery, by establishing better drainage, lessens the tendency to crust formation. Is atrophic rhinitis then a misnomer?

The general systemic symptoms are secondary. The writer's cases have shown the morbid process more often to be in the ethmoid and sphenoid sinuses; next often in the ethmoid, sphenoid and frontal, and last the ethmoid, sphenoid and antrum.

There are two types of clinical cases, one of the typical cases of Fraenkel and the other the atypical cases, with fetor and crusting. The atypical cases are less open to question in regard to sinus involvement. The third stage of the disease is more easy to cure. The after treatment is as important as the surgical exenteration. Fetor does not indicate a more intractable case. The serious obstacle to cure arises from an abnormality in the development of the bony cells. When such abnormal cells are present, certain cases of ozena are incurable by any intra-nasal method. All cases are easily re-infected, but respond readily to local applications, if the drainage is good.

Clinical Cases.

Case I. Mrs. H. C.—39 years. Born Norway. Married.

Diagnosis. Bilateral atrophic rhinitis with chronic ethmoiditis and sphenoiditis and a traumatic perforation of the septum.

Operation. Radical exenteration of the ethmoid labyrinth and sphenoid sinus on the right side, leaving the left as a check.

History. F. H. negative. Pain general over the head and face for five years. Profuse discharge from the nose for two years. Has had several previous nasal operations.

Examination. The entire nasal septum is destroyed to the ethmoid plate, leaving a large central perforation. Both inferior turbinates are shrunken and covered with crusts. Part of the middle turbinate remains. There is a large opening on either side of the cribriform plate. An X-ray shows double ethmoid clouding. The left frontal region is unsatisfactory. Thick scabs are general over both sides and underneath there is a fetid purulent secretion.

Operation. Sept. 16, 1911. Dr. Emerson.

Owing to previous operations the landmarks are destroyed. There is some difficulty in locating the agger nasi cell. The ethmoid region between the posterior ethmoid cell and the anterior is one solid bony mass, with the wall too thick to penetrate safely. The anterior and posterior region was thoroughly opened and the remains of the turbinate removed.

Operation. Feb. 12, 1912. Dr. Emerson.

Exenteration of the left ethmoid labyrinth and sphenoid under ether. Polypi in left posterior ethmoid cell removed. Partial remains of the right anterior sphenoidal wall removed.

Result. March 23d. The right side has been free from crusts and odor for two weeks. The left side has some free pus especially in the region of the naso-frontal duct and cribriform plate. Some headache on the left side.

Note. This case was followed at the writer's office for some weeks until he was convinced that there was trouble in the left frontal sinus. This was uncertain from the X-ray plate. A Killian operation was then performed, which showed that the ethmoid cells extended out of the orbit and that there was a large cell in the crista galli. The frontal sinus was full of granulations and considerable pus was seen coming from the cell in the crista galli as well as from the sinus. Such a case could not be drained intranasally.

Result. The right nose has been clear for months. The left has a few drops of clear pus coming from the frontal sinus.

Case 2. A. H. Born Ireland. 26 years. Domestic. Single.

Diagnosis. Bilateral atrophic rhinitis with chronic ethmoiditis and sphenoiditis.

History. F. H.—One brother has bilateral ethmoiditis. Mother and one sister have goitre. No specific history. Measles at nine years. Frequent colds and discharge from the nose for five years. Pleurisy four years ago for a week. Occasional headaches. Odor from the nose has made it difficult for the patient to retain her position as a domestic. She is not strong and tires easily.

Examination. Patient poorly nourished. Cheeks flushed and tongue coated. Alæ flattened. Septum deflected to the left. Whole outer nasal wall on both sides covered with a thick crust that can be removed with nasal forceps en masse. Under this a bleeding surface and free stinking pus.

Report from the Boston Consumptives Home. Lungs and sputum negative.

Operation. Exenteration of ethmoid cells and anterior sphenoidal walls.

Result. Patient was treated at intervals for a year as the ethmoid region was exenterated at intervals under local anæsthesia. For two years the patient has been entirely well with no odor or dry-

ness and the mucus membrane is clean. The sphenoidal openings are large and open. She has gained twenty pounds and has used no wash for a year.

Note. During the last year the patient has been treated only twice following an acute infection. This patient was one of the most marked cases of ozena, and she now shows a perfectly clean nose without the use of any wash.

Case 3. A. E.—32 years. Born Russia. Grocer. Married.

Diagnosis. Bilateral atrophic rhinitis with chronic ethmoiditis and sphenoiditis.

Operation. Radical exenteration of the ethmoid cells and anterior wall of the sphenoid under ether.

History. F. H. negative. Patient referred for an examination for a possible focal infection as a cause of his endocarditis. There is crusting and discharge from the nose with loss of smell. Duration seven years. He has been to several hospitals, and was there told that his disease was incurable. He is weak and finds it difficult to do his work.

Examination. Crusting over both outer walls of the nares, with very offensive discharge underneath. The second turbinates are shrunken. A large quantity of free pus is seen in the right middle meatus. The bridge of the nose is somewhat depressed. The septum is deflected to the left at the upper third. The right sphenoid cavity is very large, the left nearly obliterated.

Result. The tendency to crusting stopped in two weeks. There was persistent discharge from the region of the right sphenoid until it was discovered that there was a partition in the sinus with a narrow vertical ostia close to the septum, leading into the main cavity, which had not been opened. The partition was removed and the cavity irrigated; then treated with silver nitrate 8 per cent. Further trouble was experienced by the tendency of the margin of the anterior wall to fill in with granulations. Finally by the use of silver nitrate and trichloracetic acid to the margin, this was overcome and the cavity remained permanently open, and the discharge ceased.

Case 4. H. H. Shoemaker. Married. Born Russia. 31 years.

Diagnosis. Bilateral ethmoiditis and sphenoditis with ozena. L. O. M. S. CH.

History. Severe headaches for 8 years. (The writer had performed a radical mastoid on the left side, and in doing the dressings the foul, sour odor from the nose was very marked.)

Examination. Both nares contain a considerable amount of foul pus with crusting. The middle turbinates are boggy and myxomatous at their anterior ends. Anosmia complete.

Oct. 8th, 1912, Operation. Both ethmoid labyrinths were exenterated from before backward under ether. Both anterior walls of the sphenoid were removed and the two cavities connected.

Oct. 20th, 1912. Nose clean and no odor.

Oct. 31st, 1912. Patient discharged from the hospital and treatment continued at the writer's office.

Nov. 10, 1912. Discharged.

Result. The patient moved to Michigan and was treated there four times as the nose was not completely healed.

April 22nd, 1913. Examination by the writer showed the nares free from crusts or discharge. Both sphenoid cavities are widely opened.

Case 5. A. M. Born Nova Scotia. 44 years. Married. Furniture mover.

Diagnosis. Bilateral atrophic rhinitis with chronic ethmoiditis and sphenoiditis.

Operation. Exenteration of the ethmoid cells and the anterior walls of the sphenoids. Local anesthesia.

History. F. H. negative. No specific history obtained. Malaria 14 years ago. Several attacks of otitis media. Dryness of the nose and crusting with loss of sense of smell for 20 years.

Examination. The middle turbinals are covered with dry crusts and also the post nasal space. The nasal cavities are wide. The turbinals are atrophied on both sides, including the middle and inferior. The mucus membrane is pale and dry. There are several erosions on the septum.

Result. This case was one representing the so-called terminal stage of ozena and responded quickly to operative measures. For four years there has been no nasal symptoms.

Case 6. November 18th, 1908. C. N. C. Irish-American. Born Ireland. 53 years. Married. News agent.

Diagnosis. Bilateral atrophic rhinitis with chronic ethmoiditis and sphenoiditis.

Operation. Radical exenteration of ethmoid and sphenoid sinuses under ether.

History. F. H. negative. No specific or tubercular history obtained. Catarrh for ten years with nasal obstruction and loss of smell. Colds often. Hacking cough. Post nasal discharge. Patient spends a long time each morning trying to get his nose free from crusts. Indigestion with chronic bronchitis and bronchorrhea for ten years. Aprosexia and neurasthenia marked. Odor pronounced.

Examination. Face pale and pinched. Nose small and alæ flattened. Septum to the right. Inferior turbinates atrophied. Right middle turbinate large and covered with dry secretion. The left middle turbinate shows myxomatous degeneration and there is a polyp between it and the outer wall. Erosion on the septum. Pharynx atrophic, glazed and dry.

Result. Following a radical exenteration the crusts and odor disappeared and for two years there have been no nasal symptoms.

Case 7. M. F. Born Boston. Irish-American. 20 years. Single. Female. Brush maker.

Diagnosis. Atrophic rhinitis with chronic bilateral sinusitis of ethmoid and sphenoid.

History. F. H. negative. No specific or tubercular history. Pneumonia ten years ago. For four years the patient had had headaches on rising, especially over the right eye. Colds often. She has been under constant treatment at various hospitals for four years. Sense of smell lost; occasional epistaxis. Odor marked

S. P. General condition fairly good.

Examination. Alæ flattened; septum is deflected to the left. Both inferior turbinates are covered with crusts. Right middle turbinate very large. Much muco-pus in the middle meatus. Mucus membrane, where it is not covered with crusts, is dry and the nose obstructed. Pharynx dry.

Operation. Exenteration of ethmoid cells and anterior wall of the sphenoids under local anesthesia. Os planum on the right side is partially destroyed.

Result. Patient has been seen at frequent intervals for a year. For the last two years she has been entirely well with no nasal symptoms.

Case 8. G. B. American. Born Vermont. 25 years. Married. Advertising manager for a machine company.

Diagnosis. Atrophic rhinitis with bilateral sinusitis of ethmoid and sphenoid.

Operation. Exenteration of ethmoid and sphenoid sinuses, under ether.

History. F. H. negative. No specific history obtained. Frequent colds. Loss of smell. Nose obstructed and dry for ten years. Scarlet fever as a child. Pneumonia ten years ago. General pressure symptoms over the entire head. Muscular weakness. Aprosexia. Odor marked.

Examination. General condition poor. Face pale. Alæ flattened and dilated. Odor marked. Septum deviated to the right with a horizontal ridge and posterior spur. Both outer walls of the nares are covered with crusts, which bleed on removal. Middle turbinals swollen and ulcerated. Much muco-purulent discharge, especially in the posterior nares. Pharynx dry and glazed.

Result. This case was much improved, but on account of the fact that he lived in an adjoining state, and could not be seen except at long intervals, he is far from being cured. Since treatment was stopped there has been no crusting or odor, but there is considerable purulent discharge, which the patient can remove by using a nasal wash.

Conclusions.

The illustrative cases of ozena here presented are only a few out of a large number seen by the writer, during the last ten years. The study of these and similar cases has led to the belief that ozena is the sequel of a focal infection.

Clinically the course of events is as follows: A septal deviation causes a compensatory hypertrophy of the middle turbinal. This is followed by a chronic catarrhal ethmoiditis which interferes with drainage to such an extent that a subsequent active infection results in a sinusitis.

The foetor and crusting are probably due to the direct action of a specific pus producing organism on the tissues, without any preceding true atrophic process.

The difficulty in establishing free drainage, where there is an abnormal anatomical development of the bony cells, makes the cure of certain cases of ozena impossible with any intra-nasal procedure.

Whatever aid bacteriology may give us in curing this disease, must follow the free drainage of all foci of infection.

DISCUSSION.

Dr. Wolff Freudenthal, of New York City, said some writers still believe that tuberculosis is the cause of ozena. He had not found this to be the case. He had seen hundreds of cases, of which not more than half a dozen were associated with tuberculosis. Ozena begins as rhinitis sicca, the fetor which characterizes the condition being produced by something not yet determined. Then rhinitis atrophicans develops and finally ozena. The sphenoidal sinus is very frequently involved. Curetting the sinus and establishing drainage does not cure ozena, though it may improve it. Patients should be kept under observation, as good care is an essential part of the treatment. Some cases of ozena are suddenly cured. He cited such an instance in a girl ten years of age.

Dr. Robert C. Myles, of New York City, said the subject of ozena had been thoroughly discussed by the Ozena Committee, of which he was a member. If the study of the subject could be confined to perhaps six lines of investigation it might be possible to make some progress. He had never seen a case of ozena begin after puberty that did not have its origin in a purulent rhinitis which began before puberty. The odor which characterizes ozena disappears upon opening the sinuses and removal of crusts, as he has observed in a large number of cases. One of the factors of atrophic rhinitis is arrested development, and the important point is to check this disease before puberty. If operated upon between twenty-five and forty excellent results are obtainable. He had done very little operating in the early stages.

Dr. Lee M. Hurd, of New York City, cited a family of three children, two girls and a boy, who were brought to him about fifteen years ago for the removal of adenoids and tonsils. He had watched them from time to time since then, and all seem to have true atrophic rhinitis. In ozenous cases cleaning out the sinuses will relieve the rhinitis and the patients will do well. Clearing out the ethmoid and correcting deflections of the septum will also prove beneficial. The bacillus Bulgaricus, given in the form of sour milk, zoolak, etc., forms an important part of the medical treatment.

Dr. Dunbar Roy, of Atlanta, Ga., reported having examined over three thousand negroes during the last three years, in connection with the medical college, and he had found only one case of atrophic rhinitis and but few sinus troubles among them. The sinuses of negroes were free from pus formation. This might bear some relation to the question of atrophic and ozenous conditions being due in part to sinus involvement. These patients have flat noses and large cavities, and also a gelatinous condition of the turbinates, but atrophic rhinitis and ozena, in his experience, are practically unknown among them.

Dr. Joseph C. Beck, of Chicago, referred to X-ray pictures of Indians and negroes made by Dr. Harrison, showing that these individuals have very small sinuses, particularly the frontal sinus and the antrum.

Dr. Hanau W. Loeb, of St. Louis, corroborated the findings of Dr. Mosher. He had observed very large maxillary sinuses, and the largest sphenoid he had ever seen, in negroes. He had removed 110 polyps from a negro, in a case similar to that reported by Dr. Chamberlin.

Dr. John R. Winslow, of Baltimore, Md., asked why, if atrophic rhinitis be due to nasal accessory sinus disease, it begins at an age when the sinuses are least developed, i. e., in childhood. If not due to this, why is there such an enormous diminution in the number of these cases since nasal sinus surgery has been developed? These cases are now so much rarer that the Ozena Commission had found it diffi-

cult to find men with sufficient experience to serve on that commission. He concurred in the belief of Dr. Freudenthal, that there are at least two distinct pathologic conditions, designated under a common name.

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THE SURGICAL MANAGEMENT OF DISEASES OF THE FRONTAL SINUS.

By ROBERT CUNNINGHAM MYLES, M. D., New York, N. Y.

The problem as to the best method of surgical procedure in each case of frontal sinus disease has created many anxious moments of serious deliberation for the conscientious surgeon. The cause, process, and pathological stage are important factors to be considered in our plan of management.

Cases of acute frontal sinusitis with obstructive symptoms should be controlled by strict discipline for the patient, and by prompt, watchful, active, and definite procedures on the part of the attending surgeon. The patient should be ordered to rest, with a minimum of physical exercise. Temporary and repeated applications of solutions of adrenalin chloride and cocaine, used on a small cotton applicator under the anterior end of the middle turbinal and within the naso-frontal canal, will frequently relieve the ominous and threatening destructive pressure within the sinus. If this fails, the operation for the removal of the anterior end of the middle turbinal should be performed, and drainage of the sinuses secured by the dilatation probe or by removal of a part of the anterior ethmoidal cells and the projecting portion of the nasal process of the superior maxillary bone. The importance of limiting the operative area as much as is consistent with securing sufficient drainage should always be carefully considered on account of the possibility of spreading the acutely infective process. The writer believes that we would be justified in making a temporary drainage externally above the inner canthus of the eye in case of failure of the attempts to relieve the disease intra-nasally, because he believes that it is wiser and safer to delay the performance of the radical operation for about three weeks in order that the usual virulence of the infective bacilli may become exhausted.

The proper management of the acute and sub-acute cases of frontal sinusitis will lessen the number of chronic cases by a large percentage. There are many classes or types of cases of chronic frontal sinusitis demanding a nicety of individual judgment, and when we consider the responsibility assumed by the authority of our judgment we are well aware of the hazard encountered in making statements as to rules for definite methods of procedure.

Our science has not advanced far enough to warrant unerring rules of accurracy in all cases, but it is with pride that we notice the wonderful improvement which has been made in the treatment of the diseases and in the operative technique since the early days when the writer was so actively struggling in the mystic meshes of these complex cases.

It is evident that the pendulum swings too far with all of us in regard to the internal or the external operation, and it is also evident that habit or bias influences our methods of procedure when a cold analysis of symptoms and physical conditions should determine the best plan of surgical management. Very serious conditions often require desperate remedies. We should be prepared to do a complete radical operation when there is considerable necrosis of the mucous membrane, periosteum, or of the bone,—with or without perforation of any of the walls. When there is a neoplastic growth, especially of a malignant nature, an external radical operation is necessary, though there may be an exception in some cases of syphilis. The very small sinuses can be managed by the open method through the floor beneath the orbital ridge, without much facial deformity.

The Killian operation is the best method of procedure in cases of serious disease of the large sinuses, especially where previous injudicious and incomplete operations have been performed. Sometimes a partial Killian, using his bridge with the open method, will afford the best results in certain types of cases of the latter class. Since the writer many years ago adopted the habit of removing the anterior end of the middle turbinal, most of the ethmoidal cells, and a part of the nasal process of the superior maxillary bone, he has "managed himself out of" an opportunity to operate externally in over 90 per cent. of his cases.

The use of drainage tubes from the sinus to the nose has been abandoned after the performance of internal operation, because they seemed to excite that granulation tissue which is nearly always the cause of the failure in our unsuccessful cases. The writer has always condemned semi or thorough curettage of the sinus where we do not do the complete obliteration operation. Free drainage and free ventilation are far better for an edematous and infiltrated mucosa than a surgical mutilation. Irrigations with normal salt solution or a solution of boric acid, passed up through the enlarged naso-frontal duct with the author's malleable silver canula, have proved to be of valuable service in bringing about a favorable result. Filling the cavity with solutions of

argyol, iodoform and vaseline, or Beck's paste has, at times, apparently overcome very stubborn pathological conditions.

In conclusion, the writer would advocate certain rules for the surgical management of the diseases of the frontal sinus.

1. When the acute cases have unbearable, severe, and continuous pain in the sinus and above the eyes, attended with profound constitutional symptoms,—fever, chills, and depression,—we should proceed in a definite manner to relieve the pressure, if necessary by doing a submucous operation on an obstructive deflected septum and by removal of the anterior ethmoidal cells, and the nasal process of the superior maxillary bone; and, if this fails, should make a small incision in the skin above the inner canthus of the eye and a small opening in the bone,—a radical operation to follow a few weeks later, if necessary.

2. Chronic cases should be treated by the external operation where there is evidence of bone necrosis,—either with or without perforation; for neoplasm,—especially of malignant nature; for meningeal symptoms which are probably due to sinus disease; for continued attacks of severe pain and discharge mixed with pus and decaying debris; and to satisfy patients who demand relief from recurring attacks of frontal sinusitis after failure to obtain relief by the internal operation.

The Killian operation, combined with removal of the anterior ethmoidal cells and nasal process of the superior maxillary bone, has proved to be a most satisfactory method in cases of large sinuses. The drainway into the nose from the space where the sinus had been, should be kept open by tubes until the open space under the bridge has become obliterated. Compression over the sinus will aid materially in hastening the healing. The use of the artificial blood clot,—either combined with paraffin or not.—will decidedly relieve many of the objectionable deformities.

THE SURGERY OF THE FRONTAL SINUS.

By LEWIS A. COFFIN, M. D., New York, N. Y.

In a paper read before the New York State Medical Society one year ago, I stated that I believed we were doing at the time comparatively less operating extra-nasally on the frontal sinus, than had been done at any time since the extra-nasal operations came into vogue, due to our better understanding of the disease of the frontal sinus and of its relation to the diseases of other sinuses and also to the better intra-nasal technique which we have developed. Whereas I believe this to be true, it is still true that many cases of frontal and ethmoidal disease present that which demands an extra-nasal attack.

In response to a request from our worthy President I take pleasure in company with Dr. Myles, in opening a discussion on the Surgery of the Frontal Sinus, or more particularly the principles involved in the following question:

"Under what circumstances is an extra-nasal attack demanded on the frontal sinus?" Of these circumstances I would put,

First. Those apparently acute and fulminating cases, which present showing symptoms of extreme pressure together with marked toxicity.

Two cases which I had during the last winter in my service at the Manhattan Ear, Eye and Throat Hospital will illustrate.

The first one a lad, H. H., 12 years of age, took cold on Christmas. Complained of headache at times, but apparently recovered. Returned to school after his vacation but in a very few days complained of headache again. Was taken from school. January 12 to 15, upper eyelid became swollen. Mother was advised to take him to the hospital. On January 16th, on the way to the hospital, boy fainted in street car so that visit to hospital was delayed until the following day when he was brought to my clinic. Right eye was entirely closed. He looked septic. Temperature, pulse, etc., not taken as I expected boy to enter ward.

There was no bed. He was sent home and told to report the following morning. Still no bed. Mother came with boy to my

office when I prevailed upon her to take a private room. Boy was operated the same afternoon. He was unable to walk. All sinuses of right side filled with pus. Posterior wall of frontal sinus denuded and rough. I started to curette it but desisted for fear of uncovering the dura. This was the mistake of the operation. Temperature at time of operation 103⅘; evening temperature 104, and on the following morning 104⅗. After a dose of castor oil temperature fell to 102 and remained between that figure and 103⅕ for two days. All this time the boy still complained of pain in his head and refused nourishment, was nauseated, vomited several times, restless, sighing, groaning and tearing at the dressing on his head.

A lumbar puncture was done on the 30th of January, two days after operation. A culture showed as reported a "slight growth of a coccus of doubtful morphological arrangement. Believed to be streptococcus.

On January 21, Dr. Booth, consulting neurologist to the hospital, examined the lad and reported that in his opinion the boy had an abscess in his brain, probably in frontal lobe. Dr. Draper of the Rockfeller Institute, examined him and reported that he thought he had a beginning meningitis.

On the afternoon of January 22nd, the fourth day after the sinus operation, under general anesthesia I removed the posterior wall of frontal sinus. Immediately there was a flow of pus under considerable pressure; following the pus toward its source led me into a large abscess cavity in the frontal lobe. This was drained and patient returned to his bed. No improvement followed this operation, the patient, during the following night and day had several convulsions and died on January 23rd, five days after coming into the hospital.

Autopsy. Showed a large well drained cavity of frontal lobe and a layer of pus covering the entire convexity of the right side of brain. The meningitis was undoubtedly secondary to the abscess. A radical Killian operation done on the 12th or 15th of January would have saved the boy.

The other case was that of a young man, a plumber's helper, age 17, who entered the hospital on February 5th, suffering from severe frontal pain on right side. Right eye closed from swelling of lid. Temperature 102. Was recognized as an emergency case and operated on the day of admission. Found a sub-periosteal abscess over frontal wall. Anterior wall of frontal was appar-

ently intact, of a dark shaven beard appearance and sufficiently soft to allow of its removal with a spoon curette. A very narrow strip of frontal wall over the anterior border of the orbital roof was left in the hope that it would become more healthy and serve as a bridge to prevent too great a deformity. The case progressed favorably and was discharged from the ward 14 days after admission. About two weeks later, on one of his visits to my clinic I noticed there was more discharge than had been and patient said he was not feeling so well. Again the frontal was opened along the old incision to find what I had left as a bridge lying loose in the cavity. This was removed and the entire wound sutured. The boy made a rapid recovery and was discharged from the hospital in one week, and two weeks later from the clinic, feeling well and without discharge. An interesting episode during his visits to the clinic was the fact that one day as he was leaving the hospital a doctor about to enter his automobile stopped the young man, palpated the neighborhood of the wound, asked who did the operation and remarked that he was doing the operation without causing deformity.

Second. Those cases, which less urgent than the first class, refuse to recover under our best efforts exerted intra-nasally. Illustrated by the case of a young man also under my care in the Manhattan Ear, Eye and Throat Hospital the past winter. E. V., 28 years of age, entered my clinic early in December, complaining of all symptoms of a fairly acute and severe frontal sinusitis. No swelling of tissues about eye. Color fields contracted.

Red contracted to be within the green. Anterior end of middle turbinal was removed, frontal irrigated, some pus. Pain was still complained of at subsequent visits, but still I persisted with the intra-nasal and frontal douching until on the 22nd of December, I was called on the 'phone by the young man's family physician, who said that there was actual danger that the young man would commit suicide unless relieved of his pain. I told him to send him to the hospital and I would do a radical operation on the following day. He had a large frontal filled by a polypoid thickening of the membrane. A complete radical Killian was done. In one month the patient had gained 20 pounds. His color field had expanded to a normal condition. He was discharged cured.

Third. Those chronic cases in which the membrane has become practically devitalized to the extent of at least being beyond repair.

Some of those present saw me operate two such cases at the Manhattan Hospital during the meeting of the Surgical Congress in New York last November.

No amount of intra-nasal treatment can avail in such cases. One of these cases had been treated for quite a month by Dr. McCullagh of my staff with apparently no improvement either objective or subjective if allowed to go forty-eight hours without treatment.

Fourth. Children under the age of twelve years cannot be well operated intra-nasally. The frontal sinus is seldom much developed at that age, may become diseased, and is best operated extra-nasally. Of course, children of any age may have an empyema of the ethmoids. Although the surgery of the ethmoids is not the subject under discussion, I would simply state in passing that such cases demand an extra-nasal attack. A sad case illustrative of this class came under my care last Friday, May 2nd. A boy, nine years of age, had contracted a grippal cold six weeks ago. Had headache and fever. At the end of two weeks a fluctuating tumor appeared near inner canthus of right eye, eyelid became red and swollen so as to close right eye and partially close the left. The boy was seen by several good men, one a child's specialist who because of pus in the urine ascribed the whole trouble to the kidney. A man doing nose and ear work incised the skin over the fluctuating tumor and let out about one-half ounce of pus. An eye man examined the fundi of eyes, found them normal and remarked that he thought surgery had not been carried far enough. Shortly after, and one week before being brought to the hospital, the boy was nauseated, vomiting and had convulsions of left side of body. For a week he became progressively more emaciated and convulsions continued with greater frequency. The family physician in desperation brought the boy with his parents into the hospital on Friday evening last. Boy's temperature, 104⅘; convulsions of left side frequent; left arm paralyzed. At a consultation in which Dr. Fred Whiting, Dr. Dual, the family physician and myself took part, it was decided that in all probability there was no hope for the boy, but that possibly if the infecting focus could be cleaned up there might be some hope in serum treatment; the diagnosis being meningitis.

Under general anesthesia I did a radical ethmoid and sphenoid exenteration as well as a Luc-Cadwell operation on the antrum.

The bared bone in the ethmoidal and frontal region was of the shaven beard appearance and soft. There was a beginning frontal sinus. There was but little pus, but all sinuses were filled with granulation tissue and polypoidly degenerated membrane. About one square inch of dura was exposed in the frontal region. Upon incising the dura a small stream of serum shot into the air to the height of an inch. Cultures from this should have been made, but we were contemplating a lumbar puncture and expecting to make cultures from the spinal fluid. In this we were disappointed as the tap was dry. One injection of streptococcus serum was made, but later it was decided to give no further serum treatment as we were not certain as to which to use. He died 36 hours after operation.

Gentlemen, we sometimes criticize the general practitioner for not recognizing these cases sufficiently early, but criticism must come nearer home.

This boy during the last two weeks of his six weeks' illness was seen and treated by two men who are members of this Society. If for any reason a man feels in such a case that he cannot deliver the goods, he should pass the burden to a friend with the injunction "For God's sake make haste."

Finally. Any case in which it is known or believed that the bony walls of the sinus are diseased either primarily or secondarily to the disease of the lining membrane should be operated extra-nasally.

I shall not go into any detail as to the method of operation either intra or extra-nasally.

I feel that much better results by intra-nasal operation may be obtained since and on account of the excellent paper by Dr. Mosher before this society last year.

I may say that following the method described by Dr. Mosher is as far as I go in treating a frontal sinus intra-nasally.

In attacking the frontal sinus extra-nasally, I believe the best results are obtained by doing a straight Killian operation.

DISCUSSION.

Dr. H. Holbrook Curtis, of New York City, had said, in 1902, all he had to say on the pathology of this subject. He recalled three cases in which he had operated by the external open method and treated by packing exactly as in the mastoid operation. These were the first cases of the kind presented before the Society. Since that time he had given up much of the external surgery which he then thought necessary. He had, however, done over two hundred intra-nasal frontal sinus operations, and in only two cases had he found it neces-

sary to do an external operation after the internal. He did not allow his patients to progress to the point which necessitated external operation. He did not wish it to be understood that he considered his operation as originally presented, the object of which was to obliterate the cavity, to be comparable to the operations of Killian or Knapp, which prevented the deformity.

Dr. Thomas J. Harris, of New York City, said this symposium was included in the program for the reason that it has been a number of years since the subject has been discussed before the Society, perhaps not since Killian was present. Since that time, there has been a more or less complete change of view. Two men who have had the largest experience with the intra- and extra-nasal operations had been asked to open the discussion. Dr. Coffin has given the indications for opening the sinus extra-nasally, and Dr. Myles has stated that ninety per cent. of cases require the intra-nasal operation. The speaker did not see a single extra-nasal operation in Germany last year. There must be some reason for this. The point at issue is the treatment of empyema confined to the frontal sinus. Do the members of the Society, as representative American Laryngologists, believe that any treatment, other than treatment of the nose, is required for nasal discharge with frontal sinus involvement? Are the failures the result of faulty technic on the part of the operator, or of imperfect drainage? Should every drop of pus be eliminated? Dr. MacKenty has said that he can cure ninety per cent. of his cases by intra-nasal method. There is a large group of cases that are not cured by the intra-nasal method; is it true that this is a matter of personal technic, or is it true that in these cases this method should not be undertaken? The operation is a success as performed by Halle, who, having gotten the probe into the fronto-nasal duct, always cuts anteriorly, never posteriorly. He uses a silver tube, whereas Ingals used a gold tube. The position taken by Dr. Haskin with reference to the use of suction in the treatment of frontal sinus disease was deserving of emphasis. The method should be employed not only to relieve symptoms, but with the idea of effecting a cure without going into the sinus at all.

Dr. Lee M. Hurd of New York City said the indications, as given by the readers of the papers, differ very little from those outlined by Killian and Coakley. Suction is one of the best means for the treatment of both acute and chronic cases. In the local treatment, Beck's paste is one of the best measures known to him. It acts even more satisfactorily in the antrum and sphenoid than in the frontal sinus. He has maintained for years that ninety-five per cent. of cases can be cured through the nose. The remaining five per cent. should be promptly opened externally. During the past year he has had three failures from leaving some little cell not drained. He cited a case in which there was involvement of the ethmoidal but not of the frontal sinuses, in which he had operated five times, and had used autogenous vaccines, stock vaccines, and phylacogen, without success. After prolonged intra-nasal treatment, osteomyelitis , resulting in death, developed.

Dr. Wendell C. Phillips, of New York City, emphasized the necessity for the extra-nasal operation, in some instances, by citing a case in point. He was called in consultation, about a year ago, to see a young man, twenty-two years of age, whose family refused to permit operation without further opinion. When he reached the private hospital, he found Dr. Coakley and another specialist ready to perform the external operation. The patient had a deflected septum which almost occluded the nose on the side on which the frontal sinusitis was present. A few weeks previous an operation, supposedly a septal resection, had been performed, resulting in a small perforation but no relief of the deflec-

tion. It was impossible to see the middle turbinate. A few days after this operation an infection developed which involved all the sinuses on that side. The eye deviated from that side, and other serious symptoms were present. This was a case in which an intra-nasal operation was impossible.

Dr. Myles, in closing the discussion, thought the external operation had been taken too seriously. If, in certain acute cases under general anesthesia, a small opening were made, and too much not attempted, the patient would recover in a brief space of time. He had seen cases from different sections of the country some of whom had as many as a dozen external operations without being free from discharge. It is important, in doing the intra-nasal operation, to leave part of the mucosa of the naso-lachrymal duct, the best results being obtainable when this is done. Care should be taken not to do too much probing during the healing process, as this stimulates the formation of granulation tissue.

Dr. Coffin, in closing the discussion, could not understand Dr. Curtis's remarks with reference to having said, in 1902, all that he had to say with reference to the subject. The Killian operation had not been developed at that time. He thought Dr. Curtis considered the Killian operation of the method of choice. The speaker believed it to be absolutely wrong surgery not to go in and clean out everything that is necessary, if surgery is to be done. It is the operator's fault when these cases, if seen before serious complications have developed, do not do well. Cases operated upon during the past two years show better results than those operated before that time, which merely shows improvement in technic. He did not wish it to be understood that because he reported cases operated upon by the radical method he advocated this procedure in all cases. In extreme cases he believed in going in and cleaning out thoroughly, according to surgical principles.

NOTES ON LARYNGEAL CASES.

By WALTER F. CHAPPELL, M. D., New York, N. Y.

In all parts of the body the diseases which possess the greatest interest are those presenting some difficulty in diagnosis and this seems to be especially true in diseases of the larynx. The neoplasms, swellings, thickenings and ulcerations occurring in this vicinity present so many confusing manifestations that a definite diagnosis can usually be made only after the patient has been under observation for some time. Butlin writing on this subject said that there were three classes of cases. Those on which any one can make a diagnosis: those on which only the better instructed and more experienced make it and others do not: and the third class in which the conditions are so obscure that no one can make the diagnosis unless the larynx is opened and even then it may be difficult to make sure of the nature of the disease.

Early thickenings and swellings in the interior of the larynx have caused me the most perplexity and I sometimes think, that the more cases I see, the more difficulty I experience. Believing that my confreres may have had similar experiences, I venture to present these mingled notes, of the interesting parts of many cases. It has been my privilege to watch, from their incipient stage, the course of two neoplasms on the vocal cords, whose appearance, growth and subsequent history have been so entirely different that they have done a great deal toward helping me to an early diagnosis and the course to be followed in such difficult cases.

A man forty years of age, while suffering from a serious cold, spent about four weeks cooking peanuts in oil. The fumes were very irritating to his upper respiratory tract and he became hoarse. He gave up his employment, but as the hoarseness persisted, he sought medical advice. On examination the right cord appeared quite normal. The superior surface of the left presented three small separate flat papules on its anterior third. They had a dull red appearance and looked as though they were a part of the cord pushed up. The anterior papule was the largest and occupied the superior margin of the cord. The other two occupied the centre of the upper surface of the cord, one placed behind the other. The color of the tissue between these

papules and the rest of the cord had a natural white appearance. There were no other local appearances or symptoms to aid in a diagnosis. The father had died of carcinoma of the stomach and a brother and sister of tuberculosis. The family history did not render any further aid to a definite conclusion, a Wasserman test proved negative. The condition on the cord was fully recognized as being unusual, but the uncertainty of the nature of the papules was so great that I explained the situation fully to the patient and advised him that he should use astringents in the larynx and carefully watch the case. This was agreed to and no change was noted for about a month. The anterior papule at this time became larger and was removed for microscopic examination. The piece examined was very small, but two pathologists independently reported it to be an epithelioma. Having in mind some previous experience when the diagnosis of the microscope did not coincide with the clinical appearance and history of the case, I recommended that the case should be more carefully watched for the development of confirmatory clinical appearances. Several of my associates agreed to this course and also to see the case from time to time. For two months no change was noticeable, but during the third month the anterior papule began to reappear and extend posteriorly, soon coalescing with the other two papules. This seemed sufficient confirmatory evidence of the microscopic diagnosis and an immediate thyrotomy and removal of the vocal cord was urged. The patient, however, was in such splendid health and his throat giving him so little trouble that it was impossible to make him view his condition seriously and submit to an operation. He wandered from doctor to doctor for the next six weeks, getting various opinions, which were in the majority against his laryngeal condition being malignant.

When I saw him again the mass on the cord was considerably larger, the surface had a fine granular gray appearance and the hoarseness was more pronounced. After a great effort I succeeded in getting his consent to an operation, which was successfully performed, and there has been no recurrence up to the present, four months after the operation.

The second case was on a man of sixty-three years of age, with a good personal and family history. The laryngeal growth when first seen was about the size of a small French pea, sitting on the superior surface of the anterior third of the cord, but did not seem part of it, no thickening at the base and all surrounding tissue white and normal in appearance. The growth was removed and

submitted to microscopic examination. Two competent pathologists were consulted and one pronounced it a papilloma and the other was doubtful, but favored its being malignant. Again I decided to watch the case further as no clinical appearances led me to think it an epithelioma. During the following eight years the case was constantly under my observation and four times I removed the growth by the intra-laryngeal method. The average time of a recurrence was eighteen months and after its reappearance it grew slowly and always in the same location, and at no time was there any extension of the growth at the base.

Numerous pathologists examined the tumor after each removal and were about equally divided in their reports on its being innocent or malignant. In view of this and the excellent condition of the vocal cords and larynx, I held to the course of non-interference externally. This happy state of affairs continued until the latter part of the ninth year, when an accident occurred which changed the whole aspect of the case. To wash down a capsule, the patient swallowed as he supposed about an ounce of water, it was however 95% alcohol.

The following morning the laryngeal growth was a cherry red, also the mucous membrane of the larynx and trachea, as far as could be seen. Broncho-pneumonia followed, which nearly ended the patient's life. The cherry red color of the growth continued for a month, with no increase in size. A week later the color became a deeper red, the growth slightly larger and edematous in appearance. Two weeks later the base of the growth began to extend anteriorly and soon reached the commissure and blossomed on top, almost over night, like a cauliflower. The clinical appearance was that of a rapidly growing epithelioma, and although a microscopic examination seemed unnecessary, a piece was removed and submitted to a number of pathologists, who unanimously pronounced it a malignant growth. This was removed by an external operation through the thyroid cartilage, and the patient is alive and with no recurrence up to the present time, one year and seven months since the operation.

The change in the clinical appearance and history after the irritation of the alcohol brings up the old question as to the possibility of an innocent growth changing to a malignant one. This case would provide plenty of material for argument on this question. The early appearance and history of the neoplasms in these two cases and in others more advanced, have impressed me with the belief that a competent observer can distinguish at an

early stage between the malignant and innocent growth. The former appears as part of the tissue of the region in which it occurs and may seem to grow from under and push up the tissue above, or grow into the surrounding tissue. A papilloma on the contrary sits on the surface of the tissue and does not seem to form part of it.

Malignant growths when removed in whole or part return quickly and almost at once begin to extend at their base; even when not disturbed their first change is usually at the base. Innocent tumors do not return quickly when removed, neither do they spread from the original base as long as their innocent character is maintained. Furthermore I have found that it is quite safe to defer a major external operation until the clinical appearances and history confirms the microscopic diagnosis of malignancy.

Thyrotomy for early cases of laryngeal epithelioma is yearly increasing in popularity and any advance in technique or better prognosis is anxiously awaited by all. No intention is here made of giving in detail my cases of thyrotomy, but only a brief expression of some of my views, especially those on the management of the tracheotomy. At another time I intend to present in detail all my cases of thyrotomy. The practice of using a tracheotomy tube during the operation for thyrotomy has been generally followed, but there has been quite a difference of opinion as to what should be done with the tube after the operation. A few have taken it out immediately and allowed the wound to granulate, while others have left the tube in from one to five days. Some operators introduce a tube a week or ten days before the operation and let it remain in the trachea two or three weeks after.

My belief for a long time has been that whatever danger or difficulty was attached to an operation for thyrotomy, was due to the presence and irritation of a tube. During the past winter I have performed thyrotomy on three cases, two for the removal of epithelioma of the vocal cord and a third for a more extensive involvement of the anterior part of the larynx. In one case a tube was used during the operation and removed the following day, in the other the ordinary tracheotomy tube was not used, but a long soft piece of rubber tubing substituted and removed as soon as the operation was completed.

Two cases have been treated after this method and their success was so satisfactory that some notes of it are related in this

paper. When the trachea was exposed it was carefully pulled forward by a fine tenaculum placed on either side. A small opening was made in the trachea and a long soft rubber tube introduced. The chloroform was administered through this and packing put in above the tube to catch the blood and mucus and prevent it running down the trachea, the same as we treat the ordinary tracheotomy tube. As soon as the operation was finished the tube was removed from the trachea and the wound closed with stitches, excepting a small superficial drain at its lower part. In dealing with the larynx all tissues were treated gently and with as little traumatism as possible. The thyroid wings anteriorly were pared on either side with a sharp and heavy knife. These cartilages should never be crushed with heavy forceps as small bits of detached cartilage will remain and become necrosed, causing trouble for months afterward. Every small vessel should be tied or twisted so as to leave a perfectly dry surface. No adrenalin is necessary and is apt to cause secondary hemorrhage. When the work on the larynx was concluded the entire external wound was closed and two small superficial gauze drains left in place, but no packing in the larynx. This patient raised a little blood for a few hours after the operation but had absolutely no cough at any time and no tracheal or bronchial discharge. The external wound healed almost by first intention and a rapid and wonderful recovery was made.

This is the second case I have done without the usual tracheotomy tube and by closing the external wound completely. Tracheitis, bronchitis and broncho pneumonia which has so constantly followed this operation is, in my opinion, due to the use of a tracheal tube and its retention afterward, also to unnecessary traumatism and prolonged operation. In my future early and limited cases I do not expect any occasion to arise for the use of the usual tracheal tube and shall treat the operation as one wherein we may expect a primary union, with the usual satisfactory results. Granulations in the anterior part of the interior of the larynx always follow this operation and it takes from two to three months for them to become organized tissue. This new tissue helps to strengthen the larynx and should not be subjected to much cauterization.

A fourth case of thyrotomy for carcinoma of the cord occurred in my practice about two years ago. This case has proved very interesting as an entirely new cord of cicatricial tissue has replaced the one removed and is about an eighth of an inch wide.

has its full length and is white in color and placed exactly opposite the other cord. The voice is really excellent at times but as a good part of the thyroid cartilage was removed, the vocal sounds cannot be sustained for any length of time.

When the posterior fourth of the cord is healthy, or even a small part of it, I leave a piece attached to the arytenoid cartilage, as it gives an increased point of strength and makes the voice much stronger after recovery. One of my cases did not come under observation until the entire anterior part of the larynx was infiltrated with malignant disease, and although all of the larynx, excepting the arytenoid cartilages, was removed the patient spoke very well and could be heard ten feet away when the tracheal wound was closed.

Since the direct method of operation on the larynx has come into use, there is a great falling off in the number of men who are able to do skillful work by the indirect method. I do not believe that at any time every specialist was very adept in laryngeal operations and only a few could promise a removal with absolute certainty. The direct method has opened this field to a great number of men, as it does not require the skill and patience necessary for the indirect method. In my experience, after carefully trying the new method, I unhesitatingly favor the indirect method. It is not only easier for the skillful operator but also easier for the patient, causing less traumatism and a much more exact operation can be done. The kind of instruments for use for the indirect method need a careful selection, and in my opinion the MacKenzie laryngeal forceps should not be employed, as they are too large, obstruct the view and do not allow of exact manipulation. Fine snares and some of the new instruments are much better. Patients differ very much in the distance from the teeth to the larynx, also in the curve of the pharynx and larynx, all of which are factors to be considered. Specialists who do much of this work must be provided with instruments of various lengths and curves to accomplish a successful and skillful operation.

Two recent laryngeal cases have been selected as showing some of the difficulties which we may encounter. The first case on laryngeal examination showed a small triangular tag of red tissue below the left cord and well forward in the anterior commissure. It was only apparent on phonation, when it momentarily flashed into view to be lost immediately after. In addition to the difficult location, the patient had a long back and a large chest and abdomen, which prevented the operator from getting a satis-

factory position. He was easily nauseated and so nervous he could not hold his tongue long enough for an examination. This picture of difficulties did not look promising and he had already been treated by a specialist for five months and various attempts made to remove the growth. To produce anesthesia, twenty per cent cocaine was employed, sprayed gently with a hand atomizer on the soft palate, pharyngeal wall, root of tongue and epiglottis. With a laryngeal syringe the solution was dropped into the upper part of the espohagus, larynx and upper part of the trachea. The mucous membrane in these sensitive cases should never be touched with the usual cotton on an applicator, as it disturbs the reflexes more readily than the method I have described.

A few drops of cocaine in the upper part of the esophagus is of great assistance when there is a tendency to gagging and nausea. Properly employed twenty per cent coacine solution will quiet any rebellious larynx for operative procedure. To meet the difficulty of a patient's nervousness, I have trained my operating nurse, so that standing behind the patient she can hold the tongue with complete success.

The instrument employed for removing the growth was one of Pfau's own models of his New Universal Laryngeal Forcep, with a dull cutting bite, bent from the shank toward the growth. Its movements could constantly be watched and when the patient phonated and the growth momentarily came into view, it was seized and promptly removed. Any of the older laryngeal forceps would have obstructed the view of the operating field and could never have caught the growth without a great deal of unnecessary traumatism.

The examination of the second case showed a small triangular papilloma at the junction of the anterior and middle third of the cord but on its under surface, and bobbing into view only on phonation. An unsuccessful effort had already been made to remove it before consulting me. A long thick uvula and epiglottis tipping backward obstructed the laryngeal view. Partial removal of the uvula and a black silk thread passed through the base of the epiglottis, pulling it forward, solved our troubles.

The various shapes and sizes of the epiglottis are frequently a difficulty in laryngeal cases and can usually be treated as described. Snares are recommended for the removal of large and medium size growths. Dull cutting instruments for small growths, except for examination, but wait until you can seize the entire mass.

My concluding notes will be on an interesting condition which of late came under my notice and which for want of a better term I have called "laryngeal snoring." During the past winter a gentleman consulted me for peculiar attacks of breathing while asleep. His history was as follows. For about five years he had snored at night making the usual noises. Three years ago his wife noticed that while snoring his breathing would gradually become slow and shallow and continue so all night, with an occasional snort and blow which brought temporary relief. After about a year all these symptoms became more exaggerated, the respirations more labored and shallow and the face gradually became blue. After an hour of this breathing the patient became completely cyanosed, stopped breathing, threw up his hands like a drowning man and had a general muscular convulsion. When this took place there was a loud violent expulsion of air from the larynx and trachea and respiration was reestablished. The patient was not wakened by this but continued as though asleep and soon began the noisy respiration again and continued until another attack, and so on until seven or eight occurred during the night. Latterly the attacks were so severe that his family feared he would die of suffocation and his health began to fail from the carbonic acid poisoning from which he suffered every night. On examination the larynx was found high in the pharynx and the uvula and soft palate normal in size but hanging a little lower than usual. The mucous membrane of the uvula, soft palate, and larynx was edematous and covered with white creases, resembling the hands of a washwoman or one who had soaked the hands in hot water and had them in a poultice. I concluded this wrinkling of the mucous membrane was due to smoking as it is not unusual in heavy smokers. This patient however did not smoke and some other cause had to be found to account for such a condition. Thinking over the case it occurred to me that while the patient slept the uvula and soft palate dropped low in the pharynx and was sucked in and out of the larynx until complete occlusion was produced. A violent expiration then expelled the uvula from the larynx and temporarily reestablished respiration. Acting on this theory the uvula was removed and no attacks have occurred since the day of the operation.

The possibility of "laryngeal snoring" was so forcibly brought to my attention by this case, that I have since diagnosed several less severe but similiar cases.

SUSPENSION LARYNGOSCOPY WITH DEMONSTRATION OF METHOD.

By WOLFF FREUDENTHAL, M. D., New York, N. Y.

It is not so long ago that we thought inspection of the air passages was a closed chapter and that nothing more was to be accomplished in that direction. Then Killian introduced bronchoscopy, and this was followed by other new ideas. I need only mention the names of Mosher, Jackson, von Gyorgyai, Hays, Yankauer, Beck, and Edgar Holmes of Boston, to bring to your minds a great deal that has been done of late. But laryngology is advancing rapidly, and today again we have something entirely new, i. e., suspension laryngoscopy.

This latest discovery of Killian's is not only very interesting but his method is of great practical value in many cases, and it has been tried by the writer in a series of experiments which have extended over nine months. In the first publication** on suspension laryngoscopy, its advantages and shortcomings were defined, and after larger experience we hold practically the same views.

It is unnecessary to describe the method just demonstrated in detail, as you have seen it today and can find the full account in the publication mentioned. Permit me, however, to give some additional points which may prove useful.

Besides the necessary instruments, the first thing required is good illumination. The best for operative work, and the only kind advisable, is a good Kirstein headlight. For other work, a small lamp (or two) attached sideways may be helpful. The second requisite is a room that can be darkened (absolute darkness is unnecessary); and the third, an assistant with some experience in handling the apparatus. Trivial as these things seem to be, they are very important. The writer speaks from experience. Once, on being called to a general hospital to remove a growth from the larynx, a total failure resulted owing to the lack of proper facilities. At another time, the assistant was

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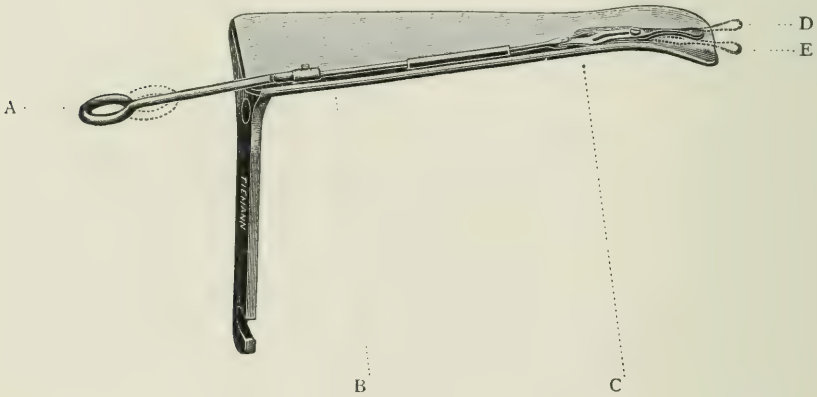
**Wolff Freudenthal: Personal Observations with Suspension Laryngoscopy. Medical Record, February 22, 1913.

entirely at fault, as he manipulated the handle so roughly that he irritated the patient, who was of a very nervous temperament, and nothing could be accomplished under local anesthesia.

Only once a slight accident occurred, which I should like to mention: M. S., a short, rather heavy-set young man, twenty-five years of age, was curetted under suspension laryngoscopy on account of an ulceration of the posterior laryngeal wall (incipient tuberculosis of the lungs). The procedure took the usual course, but immediately after the operation the whole appearance of his face changed; it became swollen, highly red, and the whole forehead was bloodshot. He suffered no discomfort, however, and I ordered simple rest and codein. The next day there was not much change. In the pharynx there were still enlarged arteries on the right lateral wall and on the left tonsil. A few days later, everything appeared perfectly normal.



Another point to be mentioned relates to the epiglottis. Years ago, when Kirstein first described his instruments for autoscopy, I noticed that the epiglottis in many instances could not be kept down with his spatula. At that time, an attempt was made by me to overcome this difficulty by means of hooks which could be pushed over the epiglottis, these being made by Tiemann & Company of New York. Later, however, this plan was forgotten, to be recalled only when the necessity for holding up the epiglottis again presented itself. The writer then resorted to the same device, which consists of a silver wire fastened in the groove of the spatula at B and C and ending in two thickened points, D and E. These can be pushed forward, and when they are in that position the epiglottis will remain in situ. By means of the

hook A we can bring the wire forward or backward. The portion AB can be turned to one side, if it is in our way. In the cases so far examined this modification has worked very well. Since writing this, I have noticed that Albrecht of Berlin had a similar idea, and published his modification of a tongue holder in the Berlin Klin. Wochensch, p. 2092, 1912. I have not seen his instrument, as it could not be obtained in New York.

Permit me to give you the details of some of the cases handled by me, which may be divided into several classes.

I. Tuberculous Cases.

These have been the most instructive, but only those will be mentioned which were of special interest to me.

G. H., a sailor, aet. 40, was referred to me in September, 1912, on account of hoarseness which had come on gradually during the last ten weeks. No pain, no cough, but a heavy feeling in his chest.

The larynx showed an irregular infiltration of the left vocal cord and a thickening of the entire right one, which was immovable. Quite a large ulceration was seen on the posterior wall. Examination of the chest revealed only the presence of a ranchitis; no tubercle bacilli. In spite of the fact that the lungs showed no positive evidence of any tuberculous affection, I took the case to be one of tuberculosis.

On October 18, several pieces from the vocal cord were removed, and the ulcerated surface was curetted under suspension laryngoscopy. The immediate result was satisfactory. The ulcer healed, and patient could breathe easier. Within a week he left for a country place. At the beginning of December, 1912, he returned, as he did not feel comfortable. On December 9, the sputum for the first time showed the presence of a few tubercle bacilli. There were some new ulcerations, which were treated with orthoform emulsion. The pain disappeared, but not the ulcers. These were curetted again under suspension on the 20th of December, and again the patient felt so much better that he left for the mountains.

In February, 1913, he returned to the city with some dyspnœa. Sputum positive, but chest findings almost the same as in the beginning. The larynx, however, had changed surprisingly. There were irregular masses springing up from both vocal cords; the arytenoids were markedly swollen, so that very little of the

posterior wall was visible, and little space was left for breathing. Patient did not care to undergo another operation, and was kept under observation, the dyspnœa growing steadily worse.

March 17. The dyspnœa was so marked that I came very near doing a tracheotomy in my office, but finally succeeded in getting him to the hospital. There I removed five large pieces from the larynx under suspension laryngoscopy, local anesthesia being employed. The bleeding during and after the operation was minimal, in spite of that very extensive removal of tissue. I mention this merely on account of a remark made by Dr. Schoetz in the Berlin Laryngological Society. (Of course this does not mean that the possibility of hemorrhage in tuberculosis of the larynx is excluded entirely, but only that we need not be afraid to operate on such cases.)

The further history of the case proved that we were right in our deductions. After the operation, the patient was put to bed and given ice externally and by mouth. All the instruments required for a tracheotomy were placed next to his bed, in case of immediate necessity. His breathing was better than before the operation, but about six hours later it again became quite bad, due undoubtedly, to edema of the larynx, which, however, subsided gradually. The next day when I examined him a good deal of edema was still present, as well as some dyspnœa and dysphagia. The day following (March 19) the picture had changed much for the better. The edema had largely subsided, he could breathe almost naturally, and felt entirely different. The dysphagia, however, was marked. Orthoform emulsion was applied.

March 24. No appetite. Patient felt like vomiting all the time. There was a false membrane in the larynx and a great deal of discharge from that source. Respiration free.

March 27. Fulguration was applied to hasten the process of healing, with the result that the edema again appeared next day, together with dyspnœa. This subsided after application of cocaine and adrenalin, but soon recurred. Examination showed a dislocation of the left arytenoid, which was flattened and lower than the right one.

The dyspnœa became so marked that on March 31st I removed part of the overhanging tissue from the right vocal cord, in the presence of Dr. Layman of Indianapolis and other colleagues. After that the breathing remained free, and about two weeks later the patient again left the city.

In reviewing the history of this remarkable case, you will find several points of interest. First. The case presented the clinical picture of advanced laryngeal tuberculosis at a time when the lungs were very little or not at all involved. Second. After we had once curetted the larynx, infiltrations sprang up so rapidly that tracheotomy became imminent. But I refrained from that operation and instead removed five large masses from the larynx. I did not know that one could with impunity resort to such an extensive excision until in this case I was simply forced to do so in order to remove as far as possible all diseased tissue, and also to give breathing space.

You will naturally ask why tracheotomy was not done, which is so much simpler. To this I must answer that I was ready to perform this operation in the hospital whenever it should become necessary, but I tried to avoid it if possible. What would be gained by it in such a case? Only the danger of immediate suffocation would be averted; but afterward, what then? We would have had to resort either to a laryngo-fissure,—and the mortality of that operation is very high indeed,—or remove the enormous masses later with the aid of suspension laryngoscopy, and that probably would have been more difficult with the trachea opened. So, after careful deliberation, it was thought best to proceed as we did. The patient has gained free breathing space without having to undergo a tracheotomy, with the eventual necessity of having to wear a tube for a long period. He has now every chance for improvement.

Another case which is remarkable for the ease by which a cure was accomplished is that of: —— ——, aet. 30, a tailor by occupation. He had suffered from tuberculosis for the last three years. He had been for about a year in Denver, Colorado, where his pulmonary condition was practically arrested. He looked well and strong, and the only thing that annoyed him was the larynx. On account of his hoarseness he could not get a position, and the irritation in his throat made him cough. Quite a good-sized interarytenoid growth was visible, which was apparently the sole cause of his trouble. In several clinics attempts at removal had been made, but they were unsuccessful. The writer had the same experience at his first attempt. When the patient was placed under suspension laryngoscopy, quite a large piece was removed, but afterwards we found that a good deal more had been left and we had to operate twice again, the last time in the presence of Dr. J. Solis-Cohen of Philadelphia, on April 16,

1913. The patient felt much better and soon withdrew from treatment. I believe him to be cured.

It must be added here that as a rule large masses of tissue are not removed at one sitting, as we do not keep such patients in the hospital overnight, and edema of the larynx is apt to set in. It is only where there is danger that we remove all that is necessary at once, even large masses.

Whether this case and the one previously referred to remained cured or not, is immaterial so far as the method is concerned. For the time being the first patient's life has been saved and the last patient's growth removed, thus giving them the best chances for recovery.

In this connection, I may be permitted to give the further history of two cases reported before.

Mrs. Z., a very nervous and excitable woman, was suffering from tuberculosis of the lungs and ulcerations of the epiglottis and left vocal cord. She was curetted on November 8, 1912, as thoroughly as possible. The dysphagia disappeared to a great extent afterward, and if it were not for the pain from the ulceration of the epiglottis,—that could not be reached,—she would have felt much better.

On February 16, 1913, the following note was made in my book. Patient had been treated for several weeks after the curetage according to the usual methods, and now she can eat and swallow like any healthy person. She had not come for treatment for the last four weeks, and now has pain in the chest, slight pleurisy.

March 12, 1913. Status idem. She only came to ask whether she should take the serum treatment so much talked about. Larynx in good condition.

April 15, 1913. She again has dysphagia, is unable to come to my office, and is being treated by a local physician. There is no doubt in my mind that the ulcerations have recurred and that she ought to be curetted again thoroughly under suspension laryngoscopy.

M. F. Had suffered from tuberculosis for about eight years and had a large mass of tuberculous infiltration, with an ulceration on the posterior wall of the pharynx. Both arytenoids seemed enlarged (perichondritis.) He had been seen by many colleagues of this city. The writer also had had him under treatment for quite a time, but it was impossible to get rid of the infiltrations. Even fulguration did not exert any beneficial effect,

as it was not well tolerated by the patient. Since his pulmonary condition did not bother him, he was naturally desirous of having his throat cured. On November 15, 1912, in the presence of a number of laryngologists who attended the Clinical Congress of Surgeons, quite a large piece was removed from the larynx. Part of the arytenoid had been caught and removed at the same time, but not the entire mass of granulations. Post-operative pain was very slight; no dyspnœa. A false membrane soon formed over the site of operation, but soon disappeared. On December 20, 1912, the whole mass was curetted thoroughly, with very satisfactory result.

On February 2nd he had to be curetted again, and what followed in this instance was similar to the condition observed in the case reported by Halle to the Berlin Laryngological Society (Berlin. Klin. Woch., p. 321, 1913), viz., the picture of a paralysis of both postici muscles. It is evident that no paralysis of central origin was present, but that by the curettage of the posterior laryngeal wall scars had formed which brought the vocal cords in adductor position. Yet he has no dyspnœa and feels quite comfortable, so that no other treatment is indicated.

It seems to us that through suspension laryngoscopy an extensive field has been opened for thorough and radical work in laryngeal tuberculosis. We are thus enabled to curette all ulcerations thoroughly, and we are furthermore in a position to remove the diseased tissues down to the healthy parts. This, for the first time, seems like real surgery of the larynx. How far we may go, the future will have to show us.

II. Abscess Formations.

As mentioned very briefly in my first article, these cases offer a great opportunity for suspension laryngoscopy, especially those of abscess in the larynx. A case that occurred in my practice several years ago is still fresh in my memory. A young woman who had a retro-pharyngeal abscess suddenly developed severe dyspnœa, the phlegmon having extended into the larynx. Both arytenoids were seen to be much swollen, apparently occluding the entire lumen of the larynx. One arytenoid was incised and a good deal of pus was evacuated. When the other was incised, the patient suddenly collapsed and fell to the floor. A hurried tracheotomy saved her life for twenty-four hours. How much better would it have been to have such a patient under suspension

laryngoscopy, with the head hanging down and the abscess draining downward by its own gravity. These cases are quite rare, but if ever there was a strict indication for a certain method it is in such patients.

While writing this article, I happened to come across another case, the history of which may be of interest to you. A married woman, æt. twenty-seven, was referred to me on February 22nd, on account of hoarseness which had persisted for six months and was gradually getting worse. She had a slight cough, but no other complaint whatsoever. I diagnosed the case as pachydermia laryngis, and treated her accordingly. Later on she suffered from tonsillitis, both tonsils being very much swollen, and it turned out that she had had such attacks before and that she was subject to rheumatism. It was decided to enucleate the tonsils some time after the acute attack was over. But no sooner had the condition of the tonsils improved than a swelling of the left arytenoid set in. This was considered as a purely rheumatic arthritis. In spite of all medication, the discomfort (dysphagia and slight dyspnœa) was very annoying. Three days later, the other arytenoid cartilage became swollen, though to a lesser degree, and at the same time true blebs appeared on top of the left arytenoid. As the dyspnœa had increased, it was naturally thought advisable to open the bleb. Remembering my former experience in that direction, I put the patient under suspension laryngoscopy, and at once saw not only the bleb on the left side but also another on the right side just below the glottis, which I had not noticed before. Both were incised, and patient felt easier. A very energetic anti-rheumatic treatment reduced both arytenoids materially, and she left the hospital without dyspnœa. (There was no pemphigus present.)

Even in abscess formation higher up in the pharynx, suspension laryngoscopy is occasionally indispensable, and perhaps may be universally adopted in the near future. Already some of our laryngologists no longer open a retro-pharyngeal abscess in young children in the upright position, but prefer to do it with the head hanging down. Accidents have happened in their clinics, and they have learned to be careful.

One case occurred not long ago which may be worth mentioning. A house surgeon in one of the larger hospitals of this city called up his visiting surgeon during the night asking his permission to open a retro-pharyngeal abscess in a young child. Consent was readily given. Some time later, the visiting surgeon was called

up again and asked what should be done with the child, as it had not been breathing for the last forty-five minutes! ! (Tracheotomy had been done.) ! ! Undoubtedly there are more observations of such fatal results, which always occur from the pus clogging up the glottis. How different is the procedure under the suspension method.

We had a chance of operating on two such cases in infants of sixteen and nineteen months respectively. In both instances the abscess was rather deep down, but showed up beautifully as soon as the child was under suspension. The whole extent of the abscess was easily seen and still more easily evacuated. The children had received only a few whiffs of ether.

This brings us to the question of

III. Tonsillectomies.

Shall they all be done under suspension when general anesthesia is employed? While the writer is not prepared to give a definite answer to this question, it is his experience that in older children the operation can be done easily in this position, and in many cases it is preferable to the prone or the upright posture. In younger children,—that is, below the age of three or four years,—the mouth cannot be opened sufficiently wide to allow the use of the comparatively big tonsil instruments with ease and satisfaction. In older children, it is simple.

If you do operate in this way, it is wise to introduce the spatula sideways and so fix it that its end is not in the median line but points toward the tonsil to be operated on. In this way, the tongue is kept entirely out of the way. If narcosis is carried out satisfactorily, the advantages of this mode of operating on the tonsils are in many cases very noticeable. The writer has operated on about twenty children in this manner, and finds that the benefits derived are due to the fact that the blood flows downward into the naso-pharynx and gets out of the way. We do not require any suction apparatus, and can finish the operation quickly and without much assistance, always provided that the anesthesia is complete.

IV. Papillomata of the Larynx in Children.

It would seem that these cases are especially adapted to suspension laryngoscopy, but the writer has not had the good fortune

to come across such a case for the past year. He has seen, however, a number of

V. Benign Neoplasms of the Larynx in Grown Persons.

These patients were absolutely unmanageable under cocaine, and the suspension had to be done under general anesthesia. The first requisite in these cases is perfect anesthesia, and you are lost without that.

The following case upon which I operated in conjunction with Dr. J. Weinstein may be of interest.

S. E., æt. 52, agent. Hoarse for the past three years. The doctor had several times removed pieces from a mass on the left vocal cord, which were always found to be benign. For the last two months patient had had some dyspnœa, and the larynx showed a large mass filling nearly the entire left side. As there was no strict indication for removal of the entire larynx, we took out as much of the diseased tissue as we could get. This was done under general anæsthesia. The patient had quite a little edema of the larynx following the operation, as well as dyspnœa, but these disappeared and I understand that he is now doing well. Examination of the tissues removed again proved to be benign in character.

In cases where it is necessary to operate on the anterior commissure, which is naturally the hardest to reach, the epiglottis has to be out of the way entirely. For that purpose, it may be sufficient in some cases to use a longer spatula or the writer's spatula with the hooks, described above. If neither of these proves adequate to bring the anterior commissure into view, as will be the case in the majority of instances, then one assistant has to press down the larynx from the outside. This helps in many cases.

Dr. J. Solis-Cohen of Philadelphia recently suggested that with a long, flexible-handled, polished steel mirror, one centimetre in diameter, one could examine and operate upon the anterior walls of the larynx and trachea under suspension laryngoscopic examination. As I had in my possession a long-handled glass mirror which had been devised for the inspection of the vocal cords from below, I straightened it and tried Dr. Cohen's suggestion. I was able to see the anterior portion of the larynx, but it is doubtful whether another instrument to remove any neoplasm could be introduced simultaneously with the mirror. Yet this is a very interesting experiment and encourages future trial.

VI. Foreign Bodies in the Pharynx and Larynx.

Dr. E. D. Davis of London removed a pin from the posterior pharyngeal wall of an infant eleven months old, under chloroform. He found the great advantage of suspension to be in the comprehensive view obtained by this method, as compared with the small area visible by the esophagoscope (Brit. Med. Jour., January 18, 1913, p. 115). The operation was apparently very easy.

It seems to us quite natural that foreign bodies in the larynx should be removed under suspension laryngoscopy, and that we ought to be able to reach them very easily without the least risk.

In conclusion, I would say that while suspension laryngoscopy is not going to revolutionize the entire domain of laryngology nor replace the old established methods in the large majority of cases, it will be,—if it is not already,—of great benefit both diagnostically and therapeutically. In the many cases where through its aid a clear view of the operative field is gained, it has proved of incomparable value.

DISCUSSION.

Dr. Hanau W. Loeb, of St. Louis, said that when Killian first presented this instrument at the Congress in Berlin he thought it a most complicated affair. He had had occasion, however, to visit Dr. Freudenthal and see him use it, and had found it very simple, quite as easily used, in fact, as is the laryngoscope. The view obtained of the pharynx and larynx was remarkable. He had not seen it employed for tonsilectomy, but could imagine that it would be useful for this purpose.

Dr. John W. Murphy, of Cincinnati, Ohio, had had limited experience with the suspension apparatus, but had found it less complicated than it looks. The ordinary tray-holder or any other extension apparatus will answer the purpose. Those who have done a great deal of work know how difficult it is to hold the speculum with one hand and get the necessary movement with the other hand. He had experienced a little difficulty at first in introducing the speculum. He does not follow the tongue, but the pharyngeal wall instead, finding this the more satisfactory procedure. In removing an enormous papilloma, he had found it much easier to work with the suspension apparatus. The assistant can make pressure over the larynx and bring the anterior commissure into view. He cited a case in which the patient was suspended for twenty-five minutes. This man had a very tolerant larynx, and found that when the instrument was properly placed, it was no more uncomfortable than the ordinary mouth-gag. The head of the patient should not be raised, but should be turned to the side. The Albrecht instrument would prove an addition to this work. By following the pharynx and not the tongue, the Albrecht instrument comes readily into place.

Dr. Richard Hall Johnston, of Baltimore, was not convinced that the method under discussion is equal or superior to straight direct laryngoscopy, which he has used for some years with satisfaction in children

and in adults. The method of straight direct laryngoscopy in children, which he had described two years ago before this Society, is just as simple in adults. The patient is seated on a stool, with the head straight or nearly so, the neck muscles relaxed, and the head turned to the right or left, as the case may be. After slight local anesthesia, the tube is passed and the epiglottis is pulled forward. Usually the entire larynx, including the anterior commissure, comes into view; if not, it may be brought into view by slight pressure of the head forward exerted by the nurse. In children, straight upper esophagoscopy is just as easy as straight direct laryngoscopy.

Dr. H. Holbrook Curtis, of New York City, referred to a case in which, at the Clinical Congress of Surgeons, a number of expert laryngologists had failed to introduce the straight speculum. He took the patient to Dr. Freudenthal, who successfully employed this suspension apparatus. In the removal of papillomata and other growths from the pharynx and larynx, this method seemed a distinct step in advance. In the case cited, the girl had recurrent papillomata. He had removed a firm growth almost occluding the larynx by the indirect method, but was amazed by the facility with which the operation might have been performed by use of the suspension apparatus, as demonstrated by Dr. Freudenthal.

Dr. Freudenthal, in closing the discussion, said that Dr. Holmes, of Boston, had invented an instrument which, though not simple, is a distinct step in advance. The same may be said of many other instruments. He preferred to use the headlight, for the reason that the light at the end of the speculum is apt to be obscured by blood. He had never tried the method on the cadaver, but had employed it immediately upon the living subject. The head is lowered gradually and the Albrecht instrument slipped in slowly. He did not agree with Dr. Johnston, with reference to direct laryngoscopy being available in every case. In cases with abscess formation, for example, he knew of nothing better than the method under discussion. For the removal of growths on the posterior wall, this method is advantageous, as it is very difficult to hold the instrument in the larynx by the straight method.

INTRA-NASAL TREATMENT OF MECKLE'S GANGLION.

By EDGAR M. HOLMES, M. D., Boston, Mass.

The treatment of the sphenopalatine as well as that of the Gasserian ganglion is almost always for the relief of severe neuralgic pain. It consists of removing the ganglion by an operation which is necessarily extensive and associated with considerable danger, of injecting some drug into the substance of the gland or of making application through the nose to the mucous membrane overlying the area of the ganglion.

As it is of considerable importance in our present study it seems advisable that we briefly review the history of the subject. In early medical literature we find much concerning the treatment of cranial and facial neuralgia. Practically every drug known at the time was tried and lauded by some writer. The hot iron, the wet and dry cup and cantharides were extensively used, but rarely with marked or permanent results. There have always been cases more or less self limited which with or without treatment have ceased and never returned. It is not the purpose of this paper to consider the major surgical treatment, and practically nothing was accomplished except by major surgery until in the early seventies. In 1874, Bartholow reported considerable success by injecting chloroform into the nerve structures. In 1884, Billroth began injecting osmic acid. He made repeated injections through the skin without exposing the nerve. About the same time Neuber and Eulenberg adopted very similar methods. In 1889, Bennett began exposing the nerve trunks by blunt dissection and injecting directly into the nerve structures a ½ to 2% aqueous solution of osmic acid. Wright, Murphy and others were heartily in favor of Bennett's methods and advocated their trial before resorting to major surgery. Schlösser was the first to record the injection of alcohol into the nerve trunks and ganglia for the relief of pain. He began his investigations about the year 1900. Baudoin, Ostwalt, Levy and others after much experience were quite enthusiastic about the alcoholic injection into the ganglia. Dr. Sluder was the first to attack the sphenopalatine fossa, through the nose. He tried various obtunding drugs in connection with the alcohol he injected in order to avoid

the excruciating pain which almost always followed the use of alcohol alone. He finally adopted a 5% carbolic alcohol and this is the solution I have used in all of my cases. Dr. Sluder's work was very painstaking and thorough, and it was due to his paper upon this subject that over two years ago I began injecting the sphenopalatine fossa through the nose under the guidance of my naso-pharyngoscope. By the aid of vision the method is so simple and exact, the discomfort to the patient is usually so slight and the results are often so gratifying that I now report the findings of the work to this society.

In this paper we have to consider two quite distinct classes of symptoms, the true tic douloureaux, the distinguishing diagnostic symptom of which is a paroxysmal intense burning, cutting, pain lasting from a few moments to a minute or more. It may occur without known cause or it may be precipitated by various stimuli as opening the mouth, swallowing, talking, sneezing and touching the face. A draught of air or a loud noise may bring on an attack. There may be from one to fifty attacks in a day. The attacks may follow day after day for years or there may be periods of relief. There may be tenderness over the nerve foramina. In some cases there are vaso-motor disturbances, flushing of the skin, hyper-secretion of the nasal mucous membrane, salivation and lacrymation. The second class of cases is quite different in character. It includes the severe acute recurring hemi-cranias, the chronic almost constant hemi-cranias, the facial neuralgias and the deep boring sub-occipital pains. A patient may be subject to one or all of the symptoms of the first class, to one or all of the symptoms of the second class or symptoms of the two classes may be present at the same time. In this series some came with symptoms of the first class, some with symptoms of the second class and some presented symptoms of both classes at different times or at the same time. As regardless of symptoms there has been relief by the treatment of Meckle's ganglion until we possess more definite knowledge, we can clinically from the standpoint of treatment consider them collectively. The important questions from the patient's standpoint are: What are the chances of relief? How severe are the treatments? How many treatments will be necessary to produce a cure or to receive the greatest possible relief, and how much danger if any accompanies the treatment? It will be seen by reviewing the history of the cases here reported that we can gain much knowledge both as to the etiology and to the prognosis of treatment by the appli-

cation of a strong solution of cocaine solution over the area of the sphenopalatine ganglion for of the 12 cases relieved temporarily by the cocaine 10 were later apparently cured by the alcoholic injection and of the 34 cases not relieved by the cocaine only eight were cured and six were more or less relieved by the alcoholic injections. In the majority of the cases there has been as a rule slight if any pain during or after the injection and therefore there has been as a rule slight shock following the treatment. As yet we cannot answer the third question, for perhaps one injection may give permanent relief or two or three injections may give no relief, while the next injection may give permanent relief, or may give relief for a short or a long period. A first injection may give relief for a few days and a second may last for a few weeks, while a third may last for months and perhaps for years. It seems justifiable and proper to follow injections as frequently as symptoms recur until the condition is relieved. If there were no improvement after three injections I would be inclined to consider the case hopeless so far as alcoholic injections were concerned. We are, however, not in a position to positively state that a case is hopeless even though three or four injections have been followed by no relief. Until I had treated my 37th case I had believed that there was probably no danger connected with the operation, but the alarming hemorrhage which began in this case on the fifth day following the injection and coming so far as we could learn from or near the area of the injection, teaches us that we must not look upon the procedure too lightly. It is possible that this will not again recur in a thousand cases, but until I have found it absent in a very large number of cases I shall always consider it and probably may be inclined not to treat some who though not suffering severely ought to be given relief.

Before injecting Meckle's ganglion the nose and epipharynx should be carefully cleansed. The patient's head should be covered by a sterile rubber cap or towel. The face should be washed with alcohol. There should be in readiness a fresh sterile ½% solution of cocaine, a fresh sterile 40% solution of cocaine and a sterile Meckle's ganglion syringe filled with a 5% carbolic alcohol solution. The naso-pharyngoscope should be cleansed with alcohol. Although I have as yet not seen signs of sepsis in any of these cases, as it takes but a few minutes to carry out antiseptic measures they, if not efficient, can do no harm and seem advisable.

After cocainizing the lower fossæ of the nose with the weak solution the scope should be inserted into the side of the nose opposite to the ganglion to be injected and should be pointed toward the side of that ganglion. The position of the ganglion which varies somewhat is approximately under the area just at the end of the middle turbinate and at this place are almost always two or three small blood vessels seen emerging from the sphenopalatine fossa. A cotton tipped applicator soaked in the 40% cocaine solution is now passed through the same side of the nose as the ganglion we wish to treat and when the tip is over the area to be attacked the applicator should be held firmly in place. The scope can now be removed and the applicator remain in place for five or six minutes. If the application has been made during an attack we may learn much by the effects upon the symptoms. If the pain ceases or is much relieved we are more likely dealing with a diseased or excitable ganglion, and in this case the chance of relief or cure is greater than when the cocaine has no effect upon the symptoms. Some cases, however, which are not relieved by applications, are relieved or cured by the alcoholic injection. We are therefore, I believe, justified in injecting all cases which are of the type suggesting ganglion disturbance.

After sufficient time has elapsed to thoroughly anesthetize the area through which the needle is to be inserted, the scope should be again passed into the opposite side and the sphenopalatine area brought into view. My Meckle's ganglion or some other suitable syringe should now be passed through the side of the nose corresponding to the ganglion to be treated. The needle must be concealed within the canula. The canula tip must be directed by the aid of the scope until it is in contact with the area into which the needle is to be thrust. It should be pointed outward and somewhat upward. The canula must now be firmly held and the needle pushed through it to the desired depth. When we feel that the needle point is in the desired position the alcoholic solution can be injected. I begin with two drops at the first injection and increase the amount a drop at following injections. Six drops is the most I have used at any time. Following the injection in some cases there is pain for a few seconds to a minute or two, which is frequently followed by a numbness in the face and in the palate. Some cases have no pain following the injection, some have immediately a numb tingling sensation in the face, and others show no effects at the time but

show results after a few days. Among the failures there are likely many in which we are not successful in striking the ganglion.

All of the cases in this report are of a chronic type. Many of them give histories of a number of years' duration. Some of them are of intermittent character and have had periods of comparative freedom from pain. It will, of course, be necessary in the intermittent cases that considerable time elapse before we can consider them as cured. I am including all cases in this study, for a number of them in this latter group were extremely intense during the attacks, and in some the attack was almost immediately relieved by the treatment.

In all there are 46 cases, and the time limit will not allow us to report them individually or at all fully. It has therefore seemed advisable to give a general summary of the treatment and results and to append sufficient of the case histories to illustrate some of the more important conditions. There were 31 females and 15 males. The oldest patient was a woman 74 years of age. The youngest was a boy 17 years of age. The average age was a little over 41 years. The first case treated was about 26 months ago, and the last case was treated over 2 months ago. The number of injections in each case varies from one to nine and the average for the series is just over three. Of the cases which were relieved by applying cocaine, 40% solution over the area corresponding to the location of Meckle's ganglion (12 in number), 10 were relieved by the alcoholic injection and two were not relieved or in the least affected. Thirty-four cases were not relieved to any degree by the application of cocaine to the area of the ganglion. Eight of these however, were cured by the injection, and six were more or less relieved. There were 22 cases which were not relieved to any marked degree by the injection. It is hardly fair to the treatment to give these failures without a few words of explanation, for some of them do not belong to this classification but were treated experimentally hoping to give relief to severe suffering. I do not believe now that injection of the ganglia was contra-indicated in these severe cases, for the chance of giving relief to a distressing condition far outweighed the slight chance of untoward results. Among the relieved were eight cases of true tic. Five cases presented mixed symptoms and eleven cases suffered with neuralgic pain not of the sharp darting type. Of those unrelieved there were three chronic suppurative sphenoid cases, four post-operative frontal sinus cases, two syphilitic necrotic cases, one glioma of the hypo-

glossal nerve, one calcareous degeneration of a second superior molar, and one case suffering severely from cicatricial contractions following an enucleation of a tonsil some three years previously. This last patient had been operated upon by a competent laryngologist, but evidently sepsis followed resulting in very marked deformity. By plastic operations I was able to relieve the marked deformity, but there remained a constant painful dragging sensation. The first injection gave temporary relief, but following injections gave no results.

Although it is impossible to give a full report of all the cases, it seems advisable to append the histories of a few, as it will give a better understanding of the subject than I can by any general remarks.

No. 6 came to me first in June 1910. She was 73 years of age and had suffered for a number of years with neuralgia. For two years she had been an almost constant sufferer with frequent intense jabbing pain worse in the left side of the interior jaw. She had been unable to eat without precipitating an attack. Her sleep had been greatly disturbed. She was emaciated and had a very haggard appearance. She had taken various drugs without relief. Hot applications to the affected area and absolute rest seemed the only measures which gave any relief. I at first tried injections into the mental foramen and into the nerve trunks, but without any apparent result. She suffered severely until February, 1911, when I injected carbolic alcohol into the sphenopalatine area. She complained of a steady pain for several hours, and then was absolutely free from any pain for three weeks, when the darting pains began. They were nowhere near as severe, but she was anxious for another injection. Another alcohol injection was made at this time and there was no pain until the last of September, six months after the last injection. Another injection was made and there has been no recurrence of pain. The patient has gained in every way and she is now as well as any one of her age.

No. 37. A woman 33 years of age began having attacks of pain in the head in September, 1911. These attacks lasted several weeks and then subsided. In February, 1912, she began having attacks of severe neuralgia in the right side of the face. The pain usually started in the right cheek and darted toward the right ear and occiput. The pain was at times steady and at times was accompanied with severe cutting, burning thrusts. Before having any trouble with pain, she had attack of catarrh of the right side of the nose accompanied with much thick yellow discharge.

Examination showed a deflection of the nasal septum to the right, with a sharp spur about ¾ back pressing into the middle turbinate. There was no sign of pus or hyper-secretion of any description. As relief from the nasal deformity was demanded, I performed a submucous operation. For a while after this operation the pain seemed less, and the improvement, though slow, was steady. In October the old symptoms became worse. The attacks became frequent, and on the 19th an injection of carbolic-alcohol was made. On December 7th the patient said pain was much less but was still annoying. Another injection was made, nothing unusual happened until five days later, when there was a protracted and rather profuse hemorrhage from the right side of the nose. Dr. French of Lynn, who first sent the patient to me, was called, and found a severe hemorrhage and the general signs which accompany considerable loss of blood. He was able to stop the severe flow by plugging the nose posteriorly and arteriorly. Even with these very tight plugs, there remained a slight oozing. I saw the patient in consultation on the 14th. As there were signs of sepsis, we tried to change the plugs. Great care was used in removing them, but the moment the anterior ones were removed the hemorrhage began. The blood was little different from colored water. Fresh aseptic plugs were immediately inserted. The patient was placed in a semi-prone position, and was given all the gelatine she would take. She remained in a practical collapse most of the time until on the 17th, when I again saw her. The plugs were, of course, getting very foul, and had to be removed. The hemorrhage was the same as before. Only a moment elapsed before new plugs were in place. We had from the first considered transfusion as well as intravenous rabbits' serum. It was decided advisable to give rabbits' serum, and it was injected by the family physician. Two days later there was no oozing, and the plugs were removed without any hemorrhage. We don't know what happened in this case, but can reasonably believe that the alcoholic injection was the exciting factor. There may have followed some necrosis which destroyed an arterial wall. We could prove nothing, for when we saw the case the hemorrhage was from a number of places, and when Dr. French first saw the case there was so much blood that he could not tell positively its origin. I am reporting this case, as it is an important factor when considering this subject. A similar case may never again recur, but until a very large number have been followed we must not ignore this warning.

No. 24 is reported individually, as it illustrates a case showing all the symptoms of sphenopalatine neuralgia but is really of another type. This patient, a woman 50 years of age, had been a sufferer for over twelve years. For a number of years there had not been a day when there had not been severe cutting pains starting on the left side of the nose and the left temple and radiating into the ear the suboccipital region and into the neck. There had been several intranasal operations and there had been two major operations for the removal of the Gasserian ganglion. The last operation was followed by facial paralysis and marked deformity but with no relief from the excruciating pain. There had been three injections of alcohol into the sphenopalatine area from the outside, but with slight if any relief. In August last I injected the sphenopalatine area intra-nasally. This gave some relief for a few days. In a month there was as much suffering as ever, and she informed me that there had always been a very sensitive point on the left side of the throat down by the roots of the tongue. Inspection showed nothing, but examination with the finger showed a small hard submucous growth which was extremely sensitive. Slight pressure was always followed by a paroxysm of severe pain. I endeavored to anesthetize with cocaine and remove the tumor, but found it impossible. The patient was then admitted to the St. Elizabeth's hospital, and under ether I removed the growth, about the size of a pea. The pathologic report was that the growth was a glioma. Following this operation the attacks were less and less and there has been absolute freedom during the past three months. This case was a failure, so far as the injection of alcohol was concerned, for although the symptoms would place it as a sphenopalatine complication, the etiology was very different.

No. 31, a man of 48, had for a year and a half been a great suffer with tic douloureax. About five or six years before the attacks there had been a profuse discharge from the right side of the nose, but no marked nasal symptoms since. For over a year he had been treated by various men at various hospitals. He had also been treated as a private patient by several. He had been unable to receive any relief. The attacks were occurring every few minutes, so that he had been unable to perform any work for several weeks. Inspection by the scope showed the area over the right sphenopalatine fossa somewhat more prominent than usual. It was more prominent than the left side. Although this was noted, we were not at this time impressed by the condition. After injecting the fossa and removing the needle, there was a discharge

of foul smelling pus. Exploration showed a general necrosis of the surrounding bone. A Wasserman of the blood was strongly positive. He was given salvarsan and was somewhat relieved for three months when the pain returned and was intense as before. I again injected the sphenopalatine area and the attacks disappeared for three weeks, when the injection was repeated. After another four weeks there had to be another injection. Since then there has been no return of trouble.

Although we have as yet not had sufficient experience to treat this subject as positively as it should be, both Dr. Sluder's experience and that gained from observation, this series of cases proves that in a certain number of these distressing conditions we can temporarily give relief by applying strong cocaine over the area of the sphenopalatine ganglion. In the cases thus relieved, we may also expect marked results from the carbolic alcohol injections of the ganglion. Those cases not at all relieved by the cocaine applications are not hopeless for a few of them have been permanently relieved by the alcoholic injection. We have demonstrated that the procedure is a comparatively precise and as a rule painless one, and can be repeated a number of times if necessary. Our one case shows that alarming symptoms can follow this treatment, and therefore we cannot as yet use it in slight cases.

DISCUSSION.

Dr. Hanau W. Loeb, of St Louis, thought the procedure presented by Dr. Sluder had accomplished a great deal when Dr. Holmes was able to report forty-six cases treated by this method. Dr. Holmes had given such a clear description of the cases upon which he has operated that one must accept them as proper ones for the employment of this procedure. There was need, however, for conservatism. When it was recalled how often pain was referred from other regions to this region, there appeared a need for careful study of other regions from which this pain might originate. It could not be doubted that sensory nerves may be put out of commission for a longer or shorter period by the injection of alcohol, as may likewise the sphenopalatine ganglion. He wished to add his emphasis to the word of caution expressed by Dr. Holmes. The use of cocaine for diagnostic purposes in these cases was a valuable point. Dr. Sauer had devised a needle for injecting the ganglion which makes it a safer procedure.

Dr. William E. Sauer, of St. Louis, had employed the method described in six cases, with good results in four, and with failure to find the ganglion in the other two. In one case, the patient had been free from pain for two years; in one, for one year, and in the others, for shorter periods of time. In one case, he made six attempts to find the ganglion, without success. In one, the patient began to vomit immediately afterward, and continued to do so for six hours.

Dr. Joseph C. Beck, of Chicago, cited a case in which failure from injecting the sphenopalatine ganglion was complicated by failure to relieve the patient even after removal of the Gasserian ganglion. The

man had had all his teeth removed. The supraorbital and mental nerves were principally involved. His suffering was so intense that from his screams the people in the house thought him an animal. Morphine had no effect. Dr. Beck injected the ganglion, and following this he did the Cushing operation, removing the Gasserian ganglion, which was hardened, sectioned, and demonstrated microscopically. It showed no pathological changes, however. This was followed by absence of sweating when pilocarpin was given on the operated side. He had severe pain in the tongue. The neurologist now said he had hysteria. Three weeks later the patient came to his service at the hospital, and was found to be suffering from sarcoma at the base of the skull. He had injected the sphenopalatine ganglion forty or fifty times with very favorable results.

Dr. William H. Haskin, of New York City, emphasized the importance of dentistry in connection with many of the cases under discussion. This had been impressed upon him by a lecturer on dental surgery. He cited three cases, of patients aged respectively 47, 59 and 63 years, who had suffered from neuralgia practically all their lives. The teeth had all been removed in each case, but a fistulous tract was found in each which led down to a supernumerary lateral incisor tooth which had failed to erupt. Such conditions can be diagnosed and demonstrated by means of the X-ray. A great many cases of trifacial neuralgia are associated with pyorrhea alveolaris, and caries of the alveolar process. All of these may be demonstrated by the X-ray. It is sometimes necessary to have a series of plates made before the trouble is revealed. He cited a case sent to him by Dr. Bogue, the patient having previously consulted other specialists. Ten plates had been made, none of which showed anything abnormal with the nose or accessory sinuses or teeth. A new series was made, with special reference to the teeth. The neuralgia, which had continued for six or seven years, had been temporarily relieved on two occasions by the extraction of teeth, but the dentist said the teeth were in perfct condition. In three of the remaining teeth, pulp-stones were found. The patient had plate work in one portion of the mouth, with pyorrhea alveolaris around the anchor teeth. Injection of the sphenopalatine nerve in this case would have done no good, whereas, treatment of the teeth had effected a cure.

Dr. Holmes, in closing the discussion, emphasized the fact that in submitting the paper he was not attempting to present anything new, except the guidance of the syringe by the aid of the naso-pharyngoscope, and merely wished in this manner to express his appreciation of Dr. Sluder's pioneer work along this line by reporting the good results which he had had with the method. He had not changed the solution because it had worked well in the first five cases. He agreed with what Dr. Haskin had said, and yet, with the exclusion of everything, there were still cases which could not be relieved. Until more is known concerning these cases, he will feel justified in injecting Meckel's ganglion in the presence of severe symptoms when nothing else relieves.

A REPORT OF EIGHT CASES OF PURULENT MENINGITIS OPERATED UPON BY THE HAYNES' METHOD, WITH POST-MORTEM FINDINGS OF FIVE.

By EWING W. DAY, M. D., Pittsburg, Pa.

Probably no paper presented at the last meeting of our society awakened more interest than that read by Dr. Haynes, on drainage of the cisterna magna for the cure of acute suppurative meningitis. His procedure, carefully worked out on the cadaver, appealed strongly to all who heard the paper, as being entirely reasonable on surgical grounds, and as offering great possibilities as a curative measure in the treatment of that most fatal aural complication.

During the past year, drainage of the cisterna magna for suppurative meningitis has been on trial, but the results are still unknown. The number of these cases that falls to one surgeon is so small that years would be required for any individual, on the basis of his own experience, to form a true judgment of the worth of the operation. If, however, we can have a report of the results of all the members present, the total number of cases will undoubtedly be large enough to enable us to place an approximately just value on this operation.

The writer has, during the last year, treated twelve cases of suppurative meningitis, nine of them by drainage of the cisterna magna. Two of these were secondary to lobar pneumonia, the infecting meningeal organism being pneumococcus; two followed fractures of the base of the skull, involving the roof of the nasopharynx, through which there was pneumococcic infection; five were of otitic origin, including two cases that had a purulent labyrinthitis, the organism being streptococcus pyogenes in three of these, and a mixed infection in the other two. It is interesting to note that, in four of these cases with streptococci in the meninges, two showed staphylococci among other bacteria but no streptococci in the pus from the ear and mastoid.

Feeling that *early* operation is an important factor in success in these cases, we tried to estimate the probable lapes of time between the invasion of the meningitis and operation. In case No. 1, a baby, the cisterna magna was drained thirty-six hours after the first signs of fretfulness, and twenty-one hours after the first

convulsion. Case No. 5, with chronic purulent otitis media and acute labyrinthitis, under close observation in the hospital, with spinal fluid free from bacteria and temperature normal for two days, and without vertigo or pain, one afternoon at 2 P. M. had a chill and a temperature of 102°, and was operated upon at 4 P. M. In this case we believe that but a few hours intervened between the invasion of the meningitis and establishment of drainage. Case No. 4, also under hospital observation, was operated upon in from twenty-four to thirty-six hours after the onset of the meningitis. Case No. 3 was well advanced and in a hopeless condition when admitted to the hospital. The remaining five were probably in the third or fourth day of the disease when operated upon.

Special attention was given during the year to observation of the condition of the veins of the fundus, and the blood pressure. The eye grounds were examined by two oculists of the hospital staff independently. In four cases that were under observation before the meningitis was diagnosed, this was done daily. In only one case was there any evidence of edema of the fundal veins. The blood pressure was taken twice daily, always by the same person, and in no case could we demonstrate any constantly increasing pressure. In case No. 5, where we believe we drained a few hours after the meningeal invasion, there was a steady fall in systolic blood pressure for five days from 120 mm., at the time of admission to the hospital, when the cisterna magna was opened, to 105 mm.

The length of time between operation and death varied widely, —in the three cases operated upon early the interval was one, three and twenty-two days respectively; in those opened after three or four days of illness the interval was eighteen hours, thirty hours, two days and four days; in the late hopeless case, three days. In the last case, the only one that recovered, the period of invasion was indefinite and the diagnosis not positively proven.

The establishment of free drainage for the cerebral fluid was without special difficulties, except in one case due to an unsuspected abscess of the right cerebellar lobe crowding that lobe across the median line. In seven cases the amount of fluid drained in twenty-four hours averaged about eight ounces. In one case, in which the dressings were weighed before being applied and again immediately on removal at the end of twelve hour periods, there was a daily drainage of cerebral fluid of 5,440 grams, (eleven and one-third ounces) for a period of eight days, no allowance being made

for evaporation that may have occurred despite rubber cap protection. This later on diminished to 1,593 grams (three and one-tenth ounces). A chemical analysis of this fluid was made by Professor Guthrie of the Medical Department of the University of Pittsburgh, who reported that it met all the requirements of normal cerebral fluid, and was not a serous transudate. In the case that recovered, there was an almost dry cisterna magna with a probable flow of not more than two or three ounces in ninety-six hours.

The symptoms present in seven of these cases were those characteristic of meningitis. In the two cases, however, where the meningitis was secondary to fracture of the base of the skull, there were extreme restlessness and later violent delirium requiring restraint in bed. These symptoms were not diminished by draining the cisterna magna. From the post-mortem findings, it was probable that in these two cases reduction of the intracranial pressure had caused fresh bleeding from a ruptured vessel with the formation of a second blood clot. In all cases but one, and this gave a dry tap, the diagnosis of meningitis was confirmed by lumbar puncture.

Following the operation in all the cases, except the two secondary to fracture of the base of the skull, there was a considerable deviation from the usual clinical course of suppurative meningitis, in that there was at first a definite period of improvement in their condition, evidenced by lessening or absence of headache, clearer mentality, loss of muscular rigidity, lower temperature and pulse. This stage was later followed, sometimes rapidly, but more often slowly, by the usual progressive sepsis, and finally ended in a deep septic coma, and death, apparently free from pain.

In duration, the period of improvement varied from a few hours in the worst cases, to nine days in the most favorable case. It is interesting to note that this period of improvement seemed to depend more on the virulence of the infecting organism than on the duration of the meningitis before operation. Of the two cases operated upon early, in one the improvement lasted but a few hours and death followed in thirty-six hours. Culture gave an abundant growth of streptococcus pyogenes in twenty-four hours. In the other, where the improvement lasted nine days, two cultures were sterile after seventy-two hours, and a third, made from dressings packed in the wound, gave but a feeble growth after seventy-two hours. This inverse ratio between the virulence of the infection and duration of improvement was noted to a less marked degree in other cases.

Thus suppurative meningitis, treated by drainage of the cisterna magna, presents three well defined periods: First, the period of invasion; second, the period of improvement; third, the period of sepsis.

An explanation for this clinical course might be as follows: The cerebral fluid from its source in the lateral ventricles passes to the brain surface via the third and fourth ventricles and cisterna magna, thence through the dural spaces to disappear mainly into the venous circulation of the superior longitudinal sinus. In meningitis, as this fluid flows over the infected areas, it gathers the products of the infections and carries them in a steady stream into the venous circulation and this produces the relatively constant high septic temperature, characteristic of this disease. When the cisterna magna is opened, the fluid is diverted from its normal course and no longer passes over the infected brain surface, but leaves the skull at the cisterna magna, and the toxins are no longer washed into the circulation. This results in a fall of the temperature, the relief of the brain pressure, and the period of improvement. However, all the infection entangled in the meshes of the arachnoid spaces does not drain back to the drainage opening, and these remaining foci nature is unable to overcome. The period of improvement will continue until absorption from these areas ushers in the period of sepsis.

These three periods are clearly defined in the following case: E. G., aged 22, American. Admitted to the Eye and Ear Hospital November 18, 1912. Chief complaints—headache, vertigo, vomiting. On November 3rd, patient awoke from afternoon nap. On sitting up in bed was seized with extreme dizziness and vertigo. Vomited at intervals. Had constant but never severe headache. Was confined to bed as he was too dizzy to walk. He had been hard of hearing in both ears, but the right, his best ear, which had been discharging at intervals for years, had become totally deaf since this attack. Never mastoid pain or tenderness.

General Examination. Patient seemed perfectly rational and not particularly uncomfortable. Showed no traces of mental dullness, irritability or inco-ordination. With eyes closed, considerable swaying but no tendency to fall in any definite direction. Knee jerks slightly exaggerated on both sides. Kernig's sign negative. Eye grounds negative, no blurring of the edges of the disc or fullness of the veins. Blood pressure: systolic 120, diastolic 60. W. B. C. 11,200. Polys. 74%. Lumbar puncture, clear fluid, under normal pressure, free from bacteria by smear and culture. Right

ear showed complete destruction of drum and some pus in canal. Caloric test negative. C_4 heard faintly.

Temperature and condition improved until Nov. 22. At 8 A. M., temperature was normal. At 2 P. M., patient had a chill and temperature 102°. Kernig's sign positive. Spinal fluid milky, but smears were negative. Cultures from centrifuged sediment sterile in various media.

Blood pressure record from time of admission, was:

November 18, afternoon.....	Systolic 120	Diastolic 60
November 19, morning.....	Systolic 110	Diastolic 60
November 19, afternoon.....	Systolic 115	Diastolic 60
November 20, morning.....	Systolic 110	Diastolic 60
November 20, afternoon.....	Systolic 105	Diastolic 60
November 21, morning.....	Systolic 100	Diastolic 65
November 22, morning.....	Systolic 105	Diastolic 60

After operation 100 for several days.

Two hours after the chill the mastoid was opened. Bone was sclerotic, antrum filled with granulations and pus under pressure. Fistula led into the horizontal canal near ampulla; vestibule and canal, opened, was found to contain free pus. Cochlea apparently free from infection. Cisterna magna then drained.

The patient made a good recovery from operation. Twenty-four hours later temperature had not been above 100⅖°. General condition good. No headache, Kernig's sign negative, no rigidity of neck. The improvement was much greater than indicated by the clinical chart. This improved condition continued for nine days with temperature ranging from 99° to 101°. Then on December 2nd there was nausea and vomiting, frontal headache, steadily rising temperature during the day to 104° at 4 P. M., which fell during the night. On the following day this cycle was repeated with a chill, temperature reaching 105°. Fearing a septic sinus thrombosis, the sinus and an area of the temporal dura were exposed, for temporal drainage if needed. The dura here presented a dry parchment-like appearance with no sign of fluid or moisture when opened. The sinus was incised for one-quarter inch and found clear. This incision was then covered with a small pad without obliterating the sinus.

Patient was now in the septic stage, with temperature ranging from 100° to 105° in the twenty-four hours, which cycle continued until death ten days later. During this time autogenous vaccine in doses from 50,000,000 to 75,000,000 were given without result.

The day before the patient's death irrigation with normal salt solution at a temperature of 100° was carried out through a canula in the lumbar spine, flushing the spinal canal out through the opening in the cisterna magna. This procedure removed a quantity of purulent material but did not benefit the patient. The drainage of cerebral fluid throughout the disease was free and abundant until the last few days. Four days after the operation, by careful estimation, it totaled 5,440 grams, but later diminished to 1,593 grams. From December 10th the patient's condition became progressively worse, with inset of opisthotonos and delirium. Autopsy December 13th, 1912, by Dr. Klotz, one hour after death.

Abstract From Report of Autopsy.

"The dura was closely attached to the skull cap, so that in removing the bone it was also cut through. In thus removing the skull cap, it was found that a considerable space was present between the inner surface of the dura and the brain substance. The dura at the vertex was quite normal and it was observed that the surfaces of the hemispheres were unusually dry and free from fluid. The convolutions of the hemispheres showed no flattening and no evidence of compression. The sinuses of the dura were all clear and without any evidence of thrombosis. The right lateral sinus, which had been opened by operation, was found normal, and on the inner side no evidence of the operative incision into the sinus could be observed. There was no clotting at the point of incision. In the cisterna magna there was some slight evidence of inflammatory reaction and evidence of a little granular lymph was present near the opening. In the region of the right middle ear the dura appeared quite shiny, but along the superior border of the petrous bone there was some injection of the fine vessels. There was, however, no evidence of lymph exudate over the petrous bone on either side. The anterior fossa of the skull was normal. Other than a slight congestion around the right petrous bone, the middle fossa was free from disease. The posterior fossa showed some inflammatory exudate at the base of the skull over the basilar process of the occipital bone and the body of the sphenoid. Here it was found that some yellow lymph was present over the body of the occupital bone, as well as around the circumference of the foramen magnum and extending a slight distance over the portion of bone at the cisterna magna. Anteriorly the lymph exudate was present over

the anterior and posterior clinoid processes, as well as over the diaphragm covering the pituitary body.

"*Brain:* The vessels of the hemispheres and cerebellum were considerably injected. The surface was dry. The hemispheres were otherwise fairly normal in appearance, save for a slight amount of yellowish exudate extending along the Sylvian fissure on the left side. This exudate could be followed along the fissure to the base of the brain. On the under surface of the brain a considerable quantity of yellowish, elastic lymph was present from the optic commissure backwards over the crura, pons, medulla and the upper portion of the spinal cord. The exudate was most intense over the medulla and the adjacent parts of the cerebellum. The lobes of the cerebellum were otherwise free from any evidence of inflammatory lymph. There was, however, a little yellowish lymph around the brain stem, close beneath the occipital lobes. There was also a little lymph on the cerebellum just above the medulla. This latter area was opposite the point of drainage in the cisterna. The lymph that was present at the base of the brain was of such quantity that the basilar artery and the circle of Willis were completely covered.

"The striking feature that presented itself in connection with the brain was the localization of the exudate to the base with only a slight deposit along the vessels of the left Sylvian fissure. The cerebral and cerebellar hemispheres were both free from an inflammatory deposit, except where this tissue bordered upon the structures at the base.

"The pituitary body showed some exudate along the infundibulum. The pituitary itself appeared reddened.

"The petrous bone on the right side was opened and a yellowish-red exudate was found present in the semi-circular canals. There was, however, no evidence of exudate in the cochlea. This canal contained a clear watery fluid. The left middle ear was found quite healthy.

"*Bacteriology:* During life the cerebral spinal fluid was examined bacteriologically on several occasions. On November 18th, 1912, fluid was obtained by lumbar puncture. The cell count of this fluid showed an excess number of polymorphonuclear leucocytes. No bacteria were obtained either in direct smears nor in the culture made from this fluid.

"On November 22nd, 1912, some spinal fluid was again obtained, and at this time it was distinctly milky and a fibrin mesh-

work developed in the fluid. Direct smears showed abundant leucocytes. No bacteria could be made out in the direct smears, nor were there any obtained in the cultures, though these were made on a variety of media.

"On November 25th, 1912, materials were received from the mastoid, the labyrinth and the cisterna magna. Direct smears showed the presence of chains of gram-positive cocci in the material from the mastoid. In none of the other direct smears were bacteria observed. In cultures made from these materials from the different regions showed the following results:

Mastoid—B. Proteus vulgaris.
B. Plebius.
Streptococcus mitis.
Labyrinth—B. Proteus vulgaris.
B. Alkaligenes.
Cisterna Magna—M. Zymogenes.

"On November 28th, 1912, some fluid which was asperated from the cisterna magna was examined. Cultures of this fluid showed the presence of staphylococcus aureus alone.

"On December 10th, 1912, fluid was obtained from the cisterna magna by injecting saline through a lumbar puncture. Cultures of this fluid showed the presence of the streptococcus pyogenes and the staphylococcus aureus.

"At autopsy a culture was taken from the fluid at the base. From this fluid the streptococcus pyogenes as well as staphylococcus aureus was isolated."

Our last case, diagnosed clinically as acute suppurative meningitis, recovered. The diagnosis, however, was never proven and is open to doubt. The patient, Martin —, a foreigner, speaking an unusual Slavish dialect, was admitted to the Eye and Ear Hospital, February 2nd, 1913. History, indefinite from inability of interpreter to understand well, was of pain in left ear, headache, and dizziness for one week. General examination: Patient very restless and noisy at times; at others, stupid and semicomatose. Temperature 99°. Eye examination negative. W. B. C. 15,600. Polys. 74%. Systolic blood pressure 110. No cervical rigidity. Negative Kernig's. Negative caloric test. Lumbar puncture in six attempts gave absolutely dry taps.

Simple mastoid operation was done by Dr. Waldie. Extensive necrosis found. On following day there was no improvement. Patient was very restless and had severe head pains. Neck muscles

very rigid. Kernigs now positive. Temperature 103°. Neumann's labyrinth operation done. Pus and granulations found. No retro-labyrinthine abscess or dural necrosis. The cisterna magna was then opened with escape of a scant amount of cerebral fluid, about ½ ounce under no pressure. As the dressing was not moist from drainage, it was not changed for four days, during which time the patient did not improve, but continued very restless and noisy, requiring the use of morphine. When the dressing was removed, about one ounce of thick yellow pus escaped. After this the patient had an uneventful recovery extending over six weeks.

The interesting features of this case are: First, though the clinical symptoms were those of meningitis, the pulse did not follow the temperature typically, but remained generally at about 90. Second, the dry tap from the lumbar puncture and scant amount of cerebral fluid. Third, rupture of a cerebellar abscess through the operation wound. Fourth, the fact that the meningitis, if present, was probably circumscribed.

From the clinical observation of these nine cases, and the post-mortem findings, which presented in general the same pathological conditions, and differed only in the extent of areas involved, we are led to the following conclusions. Drainage of the cisterna magna hinders the development of a diffuse meningitis over the hemispheres, prevents the accumulation of inflammatory exudate in the subdural spaces, but appears to have no effect upon the accumulation of pus in the paarachnoid, and does not influence the progress of the infection at the base of the brain. The accumulation here was present in all of our post-mortems, extending from the optic commissure backwards over the crura, pons, medulla and the upper anterior portion of the spinal cord.

DISCUSSION.

Dr. Samuel J. Kopetzky, of New York City, thanked Dr. Day for his fair and unbiased criticism of the Haynes method of operation. The cases presented are valuable additions to our knowledge of meningitis, and it is hoped that Dr. Day will publish them in detail in order that each case may be subjected to analysis.

The criticism with reference to the dangers of the method have not been borne out in Dr. Day's experience nor in his own. It has never been claimed that drainage of the cisterna magna is a cure for meningitis; it was stated that it is a method of controlling the pressure factors, and these once in control, then other agents—sera, drugs or anti-toxins—can be used with hope of better success than is now obtainable in those cases where the pressure factors dominate the clinical picture.

The dryness of the cortex reported by Dr. Day must not be taken as a bad sign,—one comes across the same experience in operations for tumors, and it is not found to deleteriously affect the final results. The high mortality in our operative cases of meningitis is striking, but one should remember that the mortality percentage is most high in the surgical operations on all intracranial work, and this in itself must not be considered against the procedure.

Dr. Day's division of the periods of meningitis is a distinct advance. His work of estimating the onset of the disease, however, is not agreed to by the speaker's findings. There is a period when the patient presents no clinical symptoms whatever on which a diagnosis can be made, and the speaker insisted that the chemical tests would give the earliest possible indication of the presence or absence of a meningitis. If the operation under discussion is to accomplish anything at all, it must be done in the very earliest possible period of the development of the disease. He cited a case on Dr. McKernon's service in which the patient entered the hospital on March 14th with no other symptoms than headache. The diagnosis of meningitis was made by chemical test on March 15th. The first clinical sign of the disease in the form of a Kernig appeared on the 19th, and on the 21st the child was dead. In this case, when the Kernig appeared it was too late, in the speaker's opinion, to undertake the operation.

Dr. Day's cases also show that one cannot translate to the human all the findings in animal experimentation.

Regarding the lack of finding of an advance in blood pressure and signs in the fundus of the eye, the speaker did not claim that all cases of meningitis present these, but did contend that when present they are indicative of increased cranial tension, and his contentions are supported by the observations of Harvey, Cushing, and others. He cited a case on Dr. Duel's service, said by him to be hopeless from the start, in which the blood pressure and vaso-motor changes were found only a few hours before death.

With reference to the treatment of meningitis, attention was called to the use by McKernon and others of urotropin, which had been successful in a certain number of cases, the drug having been used empirically. Recently a test has been devised which will show whether or not urotropin is broken up into free formaldehyde; for unless it is broken up into free formaldehyde, it is useless to continue the administration of the drug. This test consists of the following:

Phenolhydrozin, 5 per cent. sol.....3 drops
Sodium nitro-prusside, 5 per cent. col.....3 drops
Sodium hydroxid. saturated sol.....Excess

added to one cc. of cerebral spinal fluid. Unless this shows the green color indicative of free formaldehyde, it is useless to continue giving urotropin.

Dr. Francis P. Emerson, of Boston, said: "I have listened with great interest to Dr. Day's exhaustive and painstaking paper. The only personal experience I can offer is based upon one case of tempero-sphenoidal abscess with meningeal symptoms. In this case the symptoms were general and urgent and the Haynes operation was done at once. The following day the usual mastoid operation was performed on the right side and a tempor-sphenoidal abscess evacuated through the tegmen.

"The patient, A. McF., was admitted Oct. 26th, 1912, to the Massachusetts Charitable Eye and Ear Infirmary in the service of Dr. E. M. Plummer with the following history:

"Male 22 years. Single. Laborer.

"A. D.-E. f. f. O. M. S., cum acute exacerbation one year ago and an irregular discharge since. There was a chronic suppurative process until he was fourteen years of age. One week ago, an otalgia was

followed by an increase in secretion. The left ear is an old effect. The patient has had a marked general headache for one week with vertigo and projectile vomiting. There has been soreness in the neck and back, with cramps in the stomach for twenty-four hours. The cheeks are flushed and the sensorium cloudy. There is a rotary nystagmus to the right. The pupils are equal and react to light. There is a marked rigidity of the neck. The knee jerk is absent. Kernig marked and Tache Cerebral present. Babinski and ankle clonus not present. The cerebrospinal fluid is very cloudy, but not under pressure. The white count is 31,400. Urine negative. The fundus is also negative. The blood pressure is 125. Cultures from the cerebrospinal fluid were contaminated. The patient made an uninterrupted recovery. A complete report of the case will be published later."

Dr. Joseph C. Beck, of Chicago, reported having operated upon seven cases since last year, details of which were recently presented in Chicago, before the local Oto-Laryngological Society. Dr. Day's work corroborated his own findings. Out of the seven cases reported one had recovered. The correctness of the diagnosis of diffuse suppurative meningitis might be doubted in this case. It followed septic sinus thrombosis of the pneumococcus type. The patient, a young girl, is now perfectly well, seven months after the operation. Another case was parallel with that reported by Dr. Emerson. The diagnosis was made with all the clinical and chemical tests. In this case there was an increase in the cellular elements, unlike the one which recovered. This patient, a man, could not be put in the face down position, ceasing to breathe as soon as this position was assumed. He died the night of the operation. At autopsy a large temporo-sphenoidal abscess was found. The operation, of course, did not relieve this abscess, which was the cause of death. He added that the patient who recovered had a marked Kernig.

Dr. Lester Mead Hubby, of New York City, said too much stress must not be placed on blood pressure findings, as a rising blood pressure occurs, in his experience, only in the very beginning of a meningitis, previous in fact to the appearance of the Kernig, Babinski, stiff neck and Brudzinski phenomena. The disappearance of high blood pressure must be accounted for by the depressing action on the basomotor centers of cholin, neurin, and possibly other toxins collecting in the cerebrospinal fluid. The question as to whether to do the cisterna drainage only he believed should be answered in the negative. The cisterna and the site of the manufacture of the germs should be drained, with the greatest possible speed consistent with the least amount of jarring and the least amount of blood loss. Loss of blood interferes with keeping the blood pressure sufficiently high to maintain the vital bulbar centers.

His experience with the Haynes operation was limited to seven cases,—one of his own and two of Dr. Kopetzky's in Dr. Phillips' service at the Manhattan Eye, Ear and Throat Hospital, one of Dr. Haynes' at the Harlem Hospital, and the study of the histories of two other cases of Dr. Haynes and one of Dr. Lucket at the Harlem Hospital. All were fully developed meningitis at the time of operation, and none recovered. Three were nearly moribund at the time of operation and died within twelve hours after the operation. The other four lived three, five, five and a half, and nine days after the operation. The interesting point in his case was the disappearance of the copper reducing dextrose and the presence of lactic acid in the spinal fluid at least six hours previous to the appearance of Kernig, Babinski, retracted head, etc.

Dr. Klotz, of Pittsburgh, Pa., had been very much interested in this work of Dr. Day's, and had the opportunity of studying the pathological conditions of the cases reported in the paper. In the autopsy findings

of septic meningitis, several points stand out very prominently. In the unoperated cases there is always evidence of collection of much inflammatory exudate upon the surfaces of the brain and at the base, with the accumulation of excess fluid in the subdural spaces. In similar cases, that have been operated upon, the subdural spaces are free from fluid and are quite dry. There is no evidence of pressure from a collection of fluid in the subdural spaces when the operation into the cisterna magna has been carried on. In other words, this operation gives excellent drainage of the subdural spaces.

On the other hand, it is noted, however, that such drainage does not assist in removal of the exudate in the piaarachnoid, and in the cases that we have studied, there was no evidence that the opening of the cisterna magna had any unfavorable effect upon the course of the disease.

It has been pointed out that difficulty has been experienced in recognizing clinically the beginning of meningitis. The speaker had opportunity of demonstrating that the early infection of the cerebral meninges cannot be demonstrated bacteriologically by the examination of the spinal fluid. Twice when the cerebrospinal fluid was negative, there was found infection in the subdural fluid of the cranial cavity. Only after about 36 hours were positive cultures obtained from the spinal fluid.

Although from the pathological viewpoint, the operation of opening the cisterna magna does not appear to offer the measure which will control the infection of the meninges, yet the favorable effect of the subdural drainage associated possibly with some other therapeutic measure will offer the remedy in this very fatal disease.

Dr. R. Bishop Canfield, of Ann Arbor, Michigan, said that his experience with drainage of the basal cistern was limited to three cases. One was a case of suppurative meningitis, one of epidemic cerebrospinal meningitis and one of internal hydrocephalus. In the first case it was possible by this method to remove a large quantity of cerebrospinal fluid containing large floccules of pus. The cerebrospinal fluid was allowed to drain out very slowly and was replaced with normal salt solution. The entire base of the brain was irrigated in this way. Toward the end of the operation, the patient's respiration became very slow and deep. At one time the respirations numbered as low as eight per minute. It seemed apparent that the vital centers had been working under undue pressure. When this pressure was removed, there was a sudden marked decrease in the rapidity of the respirations, despite that twenty or thirty minutes were taken in draining the cistern.

Case II. The case of internal hydrocephalus was operated upon in the following manner. The basal meninges were uncovered and a twisted silk cable was introduced into the basal cistern. The other end of the cable, which was some four inches long, was placed under the deep neck muscles. It was intended to introduce this silk cable into the plural cavity at the level of the seventh cervical vertebra, but this procedure was objected to by the consultant. Following the operation and for some time, a decrease in the intra-dural pressure could be noticed through the open fontanelle. The child made some improvement. The appearance of the eyes was much better, and the movements of the hands was somewhat improved.

Case III. The case of epidemic meningitis was operated upon in the typical manner. Drainage was instituted, but no attempt was made to drain off all the basal cerebrospinal fluid. It was a very recent operation and the condition of the patient has not been reported to the doctor since leaving home.

The use of urotropin in a case of meningitis after the withdrawal of the cerebrospinal fluid by means of the lumbar puncture needle was tried in another case. In this case 125 grains of urotropin was introduced in two injections. Seventy-five grains at the first injection and fifty grains at the second. The urotropin was injected in 25 cc. of

normal salt solution after thirty cc. of cerebrospinal fluid had been allowed to escape through the spinal needle. Following these two injections, the cerebrospinal fluid which had been cloudy, containing 256,000 cells per C. M. M., and a great number of pneumococci, became perfectly clear, containing 250 cells per C. M. M. All symptoms of meningitis disappeared. The patient died later of pneumonia. At autopsy no macroscopic evidence of meningitis could be made out (Dr. A. S. Warthin). It required twenty minutes centrifugation in order to demonstrate pneumococci in the fluid taken from the ventricles. The doctor pointed out the necessity of making a careful diagnosis between central pneumonia with marked meningeal symptoms and suppurative meningitis in cases in which operation was considered. He further criticized Dr. Day's method of measuring the amount of cerebrospinal fluid removed, by weighing the soaked dressings, saying that as soon as cerebrospinal fluid began to leak it was secreted in great quantity by the choroid plexus.

Dr. Day, in closing the discussion, emphasized the fact that in presenting this paper he had expressed no opinion whatever with reference to the merits of the operation, and that whether the operation be a good one or a bad one, it had nothing to do with the scope of the paper. The greatest improvement in the cases cited was evidently due to the relief of pressure. In one case, in which the patient lived twenty-one days after the cisterna was opened, the operation was justified, if for no other reason than that it permitted the father to see the child with clear mentality for nine days before death. There could be no doubt concerning the fact that the operation does relieve pressure. The two abscess cases mentioned by Dr. Beck and Dr. Emerson were probably not cases of diffuse suppurative meningitis, but circumscribed. Three years ago he had reported three cases of suppurative meningitis cured by drainage of the subdural space. Two years later one of the patients returned, with re-filling of the abscess cavity and death. Autopsy performed. Failure of methylene blue under pressure to penetrate certain areas of the dura indicated that the former meningitis had been circumscribed, and it was hardly just to include such cases in estimating the value of the operation under discussion. There is much yet to be learned with reference to the circulation of the cerebrospinal fluid. The amount of drainage obtained by operation does not represent the normal secretion; it represents the most that can be secreted under artificial conditions. The arterial pressure must be higher than the pressure of the cerebral fluid; likewise, the pressure in the venous circulation must be lower than that in the arterial circulation. If the arterial pressure is equal to the pressure of the fluid there will be no secretion. When the cisterna magna is opened, the amount of fluid obtained represents the fluid secreted with zero pressure in the ventricles. The operation has not been successful in saving life. It carries the patient over the dangers of cerebral pressure only to die from sepsis. He believed Dr. Kopetzky to be wrong when he said that by making the diagnosis in the early stage the drainage operation will effect a cure. Even if the cases are seen early and the disease demonstrated by chemical tests, there will be points or puddles in the arachnoid spaces which cannot be drained through the cisterna magna. The infected fluid from these areas will eventually reach the undrainable area at the base, and the formation of pus follows.

THE TREATMENT OF PERSISTENT OTORRHEA IN INFANTS AND YOUNG CHILDREN BY THE ESTABLISHMENT OF POST-AURICULAR DRAINAGE.

By WENDELL C. PHILLIPS, M. D., New York, N. Y.

The term persistent otorrhea in infants and young children as herein used, applies to those cases in which an acute purulent inflammatory process invades the middle ear spaces, and continues without abatement for an indeterminate period after the usual five to thirty days, which ordinarily may be considered as its normal course. This type of purulent otitis media should be differentiated from that other and rather common class, which may be termed recurrent, in which recovery may take place from each attack only to be followed by recurrence at varying intervals, usually as a result of an acute rhinitis. Children of the latter class are invariably the victims of hypertrophied tonsils and adenoids, and their attacks usually cease upon the removal of these offending tissues. The recurrent type, therefore, is to be eliminated from this discussion, unless the otorrhea finally becomes persistent and chronic. A typical case of persistent otorrhea of the type under consideration presents a history somewhat as follows: Following some form of infection, which involves the upper air passages such as grip, the exanthemata or pneumonia, an acute middle-ear suppuration appears. Weakened by the primary general infection, the child's resistance is lowered, and in many instances some underlying dyscrasia, known or unknown, adds its quota to the lowered resistance. From the outset, the discharge is profuse, persistent, and of a character which plainly bespeaks a severe type of infection. The usual diminution in quantity which in ordinary cases appears at from the third to the seventh day, does not take place, but the temperature becomes normal, or nearly so, pain is not present thereafter, and there may be no marked drooping of the postero-superior canal wall. The usual local measures of treatment, consisting of paracentesis, cleansing, cathartics and rest in bed may have been carried out in full, although in many instances clinic patients have received no treatment at all.

It soon becomes evident that the small tympanic cavity proper could not secrete the amount of pus which flows from the ear, and one is forced to the conclusion that the additus and mastoid antrum at least must be involved. It is evident that such a discharge continued beyond about the third week furnishes evidence that the case is rapidly becoming chronic and calls for a different form of treatment.

It is true that proportionately a larger number of persistent otorrheas are found among the poor and ill nourished which apply for hospital or dispensary treatment.

Of the underlying dyscrasias which almost invariably prevent nature's efforts, aided by efficient local treatment, from effecting a cure of acute purulent otitis media, tuberculosis and syphilis are the most stubborn to deal with, and all writers agree that a considerable proportion of the chronic otorrheas are tuberculous in character. In these, local drainage from the membrana tympani does not seem to avail, and the disease progresses for long periods, and often with serious and fatal complications. Inanition from other causes is also a common cause of delayed cure. Severe types of infection, such as diphtheria, measles, pneumonia and grip are obstacles difficult to overcome. In many of the latter cases, however, there is a more or less rapid development of positive mastoid symptoms, hence, they are not to be considered in this discussion.

Treatment. Regarding the treatment, we do not advise any operative interference until all reasonable local measures have been faithfully carried out, this to include free drainage by paracentesis, a clean regime of local treatment and attention to hygiene and the general health. In certain patients who are the victims of markedly hypertrophied tonsils and adenoids and the purulent otitis has progressed beyond the temperature stage, it may be wise to delay post-auricular drainage for a short time and remove the tonsillar and adenoid masses. All these measures having failed, the wisdom of surgical interference must be considered, and in the writer's opinion, the quickest, safest and most rational measure to pursue is to establish post-auricular and, hence, through and through drainage by means of the simple mastoid operation.

The reasons are as follows:—

1. It quickly terminates an otherwise persistent otorrhea.
2. It insures against an extension of local bone necrosis.

3. It prevents the case from becoming a chronic purulent otitis media, with all that the name implies regarding a chronic offensive discharge, loss of hearing, bone necrosis, and possible serious and fatal complications.

4. Finally, the most important reason is, the restoration and retention of the hearing function.

It need not be added in this presence, that this operation is not a dangerous one, neither is its slight seriousness to be compared with the dangers and discomforts attending a chronic aural discharge.

In the considerable number of operations which have been performed by myself and assistants, I have been surprised at the frequency with which the pus escapes under pressure through the opening made into the mastoid antrum. Granulation tissue is also present, and in several cases an exposed sinus or dura has been found. These cases operated upon have complained of discharge for from six weeks to five years. In the more chronic ones, the simple mastoid operation has sometimes proven insufficient, and the radical mastoid operation has become necessary. In a few cases, a similar procedure has been employed in adult patients, and one or two reports of these may come out in the discussion.

It may be stated, however, that in young children, when performed any time between four weeks and three months, the results have been most favorable.

In a subsequent paper, I hope to give definite statistics of value. Others of our members no doubt hold the views herein outlined, and it is hoped that these somewhat desultory remarks may bring out a valuable discussion.

DISCUSSION.

Dr. Samuel J. Kopetzky, of New York City, emphasized the point brought out by Dr. Phillips that these cases have passed the acute stage and do not at the time of operation present the usual classical signs of acute mastoiditis, but they present evidence of a tendency toward chronicity. If it is proven, as Dr. Phillips seems to report, that one can accomplish a cure in these cases by the simple mastoid operation, then, under these circumstances, this operation should be resorted to oftener than it is performed at the present time, because it will save the hearing, and in many instances prevent the performance of the radical and all that this implies. Under Dr. Phillips' direction he had operated upon three such chronic suppurative cases in adults, who had been suffering from discharging ears for over a year. The results of all these cases will be published subsequently.

Dr. James F. McCaw, of Watertown, N. Y., emphasized the significance of persistent discharge, which he considered as evidence of involvement of the antrum at least. He did not believe it could be

cured without post-auricular drainage or more radical procedure He had operated many times in the presence of thick, persistent discharge, and which could not be cured by other measures, with most satisfactory results.

Dr. William B. Chamberlin, of Cleveland, Ohio, said he had made it a rule, both in private and hospital practice, to operate upon the class of cases under discussion after six weeks, even in the absence of swelling, mastoid tenderness, and obliteration of the post-auricular fold. It had been a surprise to him to find how often the pus was under pressure. In no case had he failed to get good results. The child comes eventually to radical mastoid operation, with considerable loss of hearing, if this is not done. He referred to a case, similar to one mentioned by Dr. Phillips, in which there was not persistent but recurring otorrhea. The adenoids had been removed previously and the patient had had three attacks of otitis media, for which paracentesis had been performed. He suggested removing the tonsils and adenoids again. The child has had at least ten attacks of otitis media since, despite a clean nose and pharynx, and several administrations of vaccines. The ear is absolutely dry during the intervals. The patient is closely watched by an uncle who is a senior medical student. The mastoid has not been opened.

Dr. Henry O. Reik, of Baltimore, said, "I should like to ask Dr. Phillips why this operation is distinguished by a special title—'Post-auricular Drainage'—if, as appeared from his description, it is a simple mastoidectomy? If it differs in any way from the ordinary simple mastoidectomy, will he kindly tell us in what respect it differs? In addition, I would like to say that the arguments adduced in favor of this operation, both by the essayist and by Dr. Kopetzky, sounded strangely like those offered some little time ago by Mr. Heath, who was severely criticised because, it was said, his leaning was toward operating upon every case of suppurative otitis media."

Dr. Ewing W. Day, of Pittsburg, Pa., said that he has an X-ray picture taken, and if pus in the antrum is demonstrated he operates; if pus is not demonstrated he does not operate. These are mostly clinical cases, children who come from the tenements, whose vitality is below par, and whose resistance is poor, but it has been found that they respond very well to treatment with vaccines. In private cases he has found that the vaccines do no good whatever.

Dr. John F. Culp, of Harrisburg, Pa., cited the case of a little child, sent to him by the family physician with a tentative diagnosis of mastoiditis. There was a history of three attacks of discharge from the ear within six months. Examination revealed none of the signs of mastoiditis and the patient was sent home, with the suggestion that the physician keep it under observation. About two weeks later the child contracted a cold, a swelling appeared behind the ear, was operated upon by his assistant, and complete destruction of the mastoid was found. The lateral sinus was exposed. He regretted that he had not heard Dr. Phillips' paper before he saw the case the first time.

Dr. D. J, Gibb Wishart, of Toronto, Canada, thought the point well taken by Dr. Reik that the title of the paper hardly brings out the meaning which the author has in view. He illustrated the point by citing a case upon which he operated three days before he left home. The patient, a man, with an acute otitis media, and discharge from the ear, was taken into the hospital, kept there for five weeks, and then sent home. At the end of seven weeks thereafter, during which time the ear had been discharging, he was brought to the speaker, who found that the family physician had made four or five incisions be-

hind the ear, down to the bone, from all of which pus was oozing. There was plenty of post-auricular drainage, but the patient was very badly in need of a mastoid operation. He had been in the habit of operating upon these cases, in adults and children, exactly in line with the paper, because he believed that by this means the patient's hearing can be saved.

Dr. H. Holbrook Curtis, of New York City, called attention to the fact that the general practitioner is very often opposed to this method. He had had two cases in which persistent discharge had continued for eighteen months and in which the family physician refused to consent to this simple operation.

Dr. Joseph C. Beck, of Chicago, said he had been able in some instances to overrule the objections of the general practioners by calling their attention to the fact that they would not allow an appendicitis to continue without operation, and yet are willing to allow an infection in the middle ear to continue. Very frequently the X-ray does not reveal the true condition. It should be borne in mind that in young children the mastoid is of the diploetic type.

Dr. Phillips, in closing the discussion, said he had had some X-ray pictures taken, but they are of no assistance beyond the antrum for the reason that in young infants there are no mastoid cells. He believed success in these cases is due to the through and through drainage, just as described in the paper. He had distinctly stated that it was a simple mastoid operation. The comparison with Heath's operation was interesting. The cases in which Heath gets favorable results are those in which he does the simple mastoid operation; those in which he gets unfavorable results are those which require mastoid operation. The case reported by Dr. Wishart is not in the category under discussion. It should have been operated upon before. Regarding the matter of consent to operation, he had often found the family physician to be the one to interfere. . Dr. Beck, with his usual acumen, had devised a good method.

A GLIOSARCOMA OF THE LEFT LOBE OF THE CEREBELLUM, GIVING EXTERNAL SYMPTOMS OF MASTOIDITIS. REPORT OF CASE.

By JAMES F. McCAW, M. D., Watertown, N. Y.

Mrs. G. O., age 31 years, seen in consultation, September 3rd, 1912. Family history: Father and mother both living and in good health, one sister living and healthy. Personal history: Has never been robust and has suffered from "sick headaches" since early childhood. For several years these attacks have been getting more frequent and with increasing severity, accompanied by nausea and vomiting; this condition lasting sometimes for several days. For six months she has been losing flesh and strength and feels nauseated the greater part of the time, but able to attend to her household duties. Two months ago she contracted a severe head cold which was followed by quite sharp earache on the left side which lasted several days, but no discharge from the canal. This was followed in a few days more by "neuralgic pain" back of the left ear. This pain has continued with only slight intermissions ever since, and for four or five days has been so severe that sleep was impossible except under an opiate. Has been very much nauseated and vomited at short intervals for two days continuously; these attacks being aggravated by the increase in the severity of the paroxysms of pain in the top and left side of head. With the development of pain over the left mastoid there appeared attacks of vertigo so severe at times as to compel her to take the recumbent position. For the past four days these vertiginous attacks together with the pain, nausea and vomiting had become so frequent and severe that she was compelled to remain in bed. Three days before I saw her, there appeared a soft swelling behind the left ear.

Examination: Patient somewhat emaciated, anemic, a very decided sallow complexion and an expression of suffering; the auditory canal clear, membrana tympani lusterless and slightly retracted, hearing good. There was some edema over the entire mastoid region, at the posterior margin at about the location of the emissary vein there was a smooth fluctuating tumor about an

inch in diameter, exquisitely sensitive to pressure. Much manipulation of this mass would produce a sensation of nausea. Upon deep pressure there was decided tenderness over the entire mastoid area, the sensitiveness increasing as the fluctuating tumor was approached. There was no evidence of muscular twitching or paralysis, sensation so far as could be determined was normal, mobility of the eyes perfect, and pupillary reaction negative. The eye grounds showed a slightly choked disk in each; and distributed over the fundus of each eye were small flame shaped hemorrhages; sight distinctly blurred, the exact degree however was not determined. Temperature 99 F., pulse 72, respiration 18. At this time we could not satisfactorily interpret the symptoms and the objective findings. The writer was convinced, however, that there was some intracranial involvement the nature of which was in doubt, from the fact that there was a history of middle ear trouble two months previously with gradual development of mastoid involvement and the appearance of a fluctuating tumor over the same area. The symptoms, however, were sufficiently urgent to warrant an exploration. She was sent to the hospital and I operated upon her the next morning. The usual mastoid incision was made and another beginning at about the middle of the original incision and extending downward and backward, opening into the fluctuating tumor above described, which was found to be composed of necrosed tissue blood clots and dark grumous fluid blood. The flaps were then elevated, the antrum entered and found normal. The external table of the mastoid was then chiseled away, which revealed an exceedingly pneumatic process, each cell very large, prominently outlined and filled with dark thick blood, the membranous lining of each cell was decidedly thickened and velvety looking, being infiltrated and colored by the same bloody material. No pus was found. This entire area was curretted away and as the sigmoid sinus was approached it was found exposed by a necrosis of the inner table beginning above the knee and extending downward for about one and a half inches; this necrosis also extended downward and backward from the sinus, exposing a large area of thickened dura. Just below and behind the knee there was a necrotic opening in the dura filled with a firm blood clot, directly connected with the tumor noticed externally. All clots were carefully removed and a subdural exploration made which revealed a large bleeding mass. The hemorrhage was so severe that it was thought wise to defer further operative work at this time.

The wound was cleansed and packed tightly with iodoform gauze and a compressive bandage applied. The patient reacted nicely, and next morning said that her head felt clearer than it had for months. For two days there was a great quantity of blood oozing so that the dressings had to be reinforced several times. The first dressing was done on the third day and every second day thereafter. At each dressing it was evident that the clot projecting through the dural opening was getting larger and firmer with more resistance below the dura; but as her symptoms were all relieved and she seemed to be making such favorable progress it was thought wise not to explore further. However, all of her old symptoms began to reappear at the end of three weeks, so that it was impossible for her to retain nourishment. On September 29th I again operated upon her; this time cutting away the bone below and posterior to the sigmoid, thoroughly exposing the cerebellar fossa, the dura which was very thick was freely incised over this area. Terrific hemorrhage ensued and the tumor 2½ inches by 1½ inches which I here show you, presented in the dural opening. My finger was quickly passed around it and delivered it from its bed. It occupied the anterior part of the left lobe of the cerebellum. The cavity had to be rapidly packed to control the hemorrhage, so no detailed examination of it could be made. The patient suffered greatly from shock and hemorrhage, but under the usual treatment rallied nicely in about forty-eight hours. All pain, nausea, vomiting and vertigo were relieved by the removal of the growth, but when she left the hospital twenty-eight days later, there was a cerebellar hernia and the evidence of a return of the growth at the anterior part of the wound. This patient went back to her home in Canada and died about two months later.

Pathologist's Report:

"Pathological Laboratory. Medical Department. Queen's University.

"Examination of fungating growth from behind ear of Mrs. G. O. Portion brought consisted of the fungating part of tumor protruding through skull over lateral cerebellar region. The surface of this mass was full of bone spicules while deeper parts were markedly hemorrhagic with strands of lighter tissue running through same.

"Sections were made in different portions of growth. The deeper parts showed structure of glioma with much hemorrhage

and zones of inflammation. Toward the surface the cellular elements of bone (osteoblasts and osteoclasts) were abundant and actually proliferating and there were areas both of new bone formation and of bone absorption. On surface, newly formed bone was abundant with large marrow spaces. No doubt the primary condition was glioma (glioma-sarcoma) which in fungating through operation wound has sharply stimulated the bone cells to growth.

"W. T. CORNELL, M. D."

Examination of the original growth gave the same general findings and diagnosis.

Aside from the interest which this case possesses as a brain tumor, there are several unusual features in connection with it which I think should interest us as otologists. Here was a case giving a history of ear trouble, two months before with the gradual development of mastoid involvement, with all the external symptoms positive, accompanied by unmistakable evidence of intracranial pressure and still the findings at the time of operation showed the ear and antrum negative. Such a coincidence in history and symptom development in a less pronounced case might be very misleading. Such a combination of circumstances must be exceedingly rare.

The wide spread blood extravasation involving all the mastoid cells and the formation of an hematoma below the periosteum resulting from extensive necrosis of both cranial tables due to the extreme intracranial pressure, the source of the bleeding being subdural; which fact was demonstrated at the first operation when the clot was traced from the sub-periostal hematoma into the mastoid cells and through the dural opening, must be rather unusual conditions.

The position of the tumor in the lower and outer part of the cerebellar fossa, would, I think, in a measure explain the great tendency to bleeding. As the tumor developed it certainly produced increasing pressure on the sigmoid sinus just above the bulb, which no doubt, interfered with the return circulation, and therefore a factor in the greater tendency to excessive hemorrhage.

When we consider the wide spread destructive changes that must have been going on for a long time, it is most surprising that definite symptoms of intracranial involvement were not sooner developed.

Dr. Joseph C. Beck, of Chicago, reported having lost a brother two months ago from a glioma in the post-auricular region, situated supra-tentorially. He went all over the country to get relief, but no positive diagnosis could be arrived at until shortly before death. The fatal termination came a week later. It showed how difficult is the diagnosis of tumors in this region. The symptoms from the otological point of view were important, as shown by the post-mortem. When he spoke to physicians skilled in diagnosis of these symptoms in this case they told him that, because of his interest, he saw symptoms which did not exist. If otologists were consulted in these cases better diagnoses would be made. If a flap had been made in the retro-auricular and extra-dural region the tumor would have dropped out, it had such a small pedicle and was entirely outside of the brain structure.

ON THE EFFORTS OF NATURE TO CURE SEPTIC THROMBOSIS OF THE LATERAL SINUS.

By HARRY FRIEDENWALD, M. D., Baltimore, Md.

Two cases have come under my observation which impressed me with the curative efforts of nature—if we may so call the processes which tend to circumscribe and eliminate the infected thrombus in the lateral sinus. When we consider the desperate prognosis of untreated cases, we are warranted in giving our attention to these observations together with those that have been reported hitherto. In doing so, there is not the slightest intention to minimize the danger of untreated thrombosis.

Case 1 has already been reported in another connection to this Society* A brief statement is as follows:—

In December, 1903, I was called to see a child two years of age which had within a few months suffered from an attack of scarlet fever, followed by measles. Double purulent otitis media was the result. A swelling had appeared over the left mastoid which a physician had incised three weeks before I saw the patient. I found a marked hard swelling about an inch behind the incision over the mastoid. The ears were both discharging. On the following day, the mastoid operation was performed. No visible opening into the mastoid was found in the surface of the bone, which contained pus and granulations. The mastoid process having been cleaned out, a second incision was made one inch posteriorly into the abscess, and much pus evacuated. The bone was denuded. The patient made a good recovery, but both wounds continued to suppurate and excessive granulations formed. In dressing the wounds, we found that a probe could be passed far into the posterior one, but it was not possible to determine its exact position.

On February 3rd, 1904, the patient having been admitted into the City Hospital (Baltimore), I found that the probe passed far into the skull cavity. An incision was made which joined the two previous incisions and the bone was exposed. It was then found that a fistula extended from the posterior wound into the skull, the opening being situated in the masto-occipital suture. The

*The Laryngoscope, January, 1909. Page 22.

opening was not more than five or six mm. in diameter, and was perfectly circular. It was enlarged and the bone removed forwards towards the ear, thus exposing the fistulous canal. We then found that the pus had not come from an extradural abscess, but that it was the lateral sinus itself which was continuous with the fistula. A grooved director was passed into the canal and it was slit open. In the sigmoid portion, the part was found where the sinus had been exposed to the mastoid disease and where the infection had occurred. It was evident that a septic thrombus had formed but had been securely shut off from the circulation by firm clots, and that the pus had evacuated itself through the emissary vein, thus producing the abscess.

The case just described furnished an example of the limitation of the septic thrombus which is to be regarded as a conservative effort of nature.

Case 2. Katie S., aged 8, was admitted to the Mercy Hospital (Baltimore), November 20, 1912. She had had measles when 2 years old, but not scarlet fever. The right ear had been discharging since she was 5 years old, the discharge having a bad odor for some time. When the discharge was free there was no pain, but when the ear was not running she complained of great pain in the head. For about a year there were frequent recurrences. The pain would last a few hours and would then pass off. She was able to go to school until four days before entering the hospital. At this time she became quite sick, and a physician was called in who thought she had typhoid. She had high fever, was delirious and very weak.

On entering the hospital, we found destruction of the right tympanic membrane, and the middle ear filled with foul pus. There was no marked sensitiveness over the mastoid or over the course of the jugular vein. Her temperature showed a pyemic character with mild chills, high rises and rapid falls of temperature.* The urine showed some albumen and a few hyaline and granular casts and pus cells. The blood examination revealed polynuclear leucocytes 76%, small mononuclear 17%, large mononuclear 6%, and a total white blood count of 20,500. A blood culture made on November 23rd on agar plate, bouillon and serum water, was sterile. The eye-grounds were normal.

*Nov. 20, 4 p. m., 100.4; 8 p. m., 100.8; 12, 105.4. Nov. 21, 4 a. m., 103; 8 a. m., 102.4; 12 m., 98.8; 4 p. m., 98; 8 p. m., 99; 12, —. Nov. 22, 4 a. m., 99.6; 8 a. m., 97.6; 12 m., 97.8; 4 p. m., 97.8; 8 p. m., 98; 12, 101.8. Nov. 23, 4 a. m., 99; 8 a. m., 98; 12 m., 97; 4 p. m., 97.8; 8 p. m., 101.8; 12, ⊢. Nov. 24, 4 a. m., 102; 8 a. m., 100.4; 12 m., 98.2.

The operation was performed November 24, 1912. Ether anesthesia. The regular mastoid incision was made, extending from the level of the top of the auricle down to a point below the tip of the mastoid. The bone was exposed widely on both sides. A minute fistulous opening was found above the mastoid antrum from which pus of a very foul odor exuded. This opening was enlarged with chisels; the bone was very sclerotic; a large cavity was entered, filled with the same character of pus, pulsating actively. The sinus was found exposed extensively. The antrum was then opened and contained a cholesteatoma. A radical operation was performed, thoroughly cleaning the middle ear of pus and cholesteatomatous masses. The bone over the sinus was next removed upward to the knee and downward to the bulb. The upper half of the sigmoid sinus appeared distended and covered with coarse, thick granulations. The lower half was smooth and whitish and seemed collapsed. On closer examination, the entire wall of this part of the sinus was seen to have been destroyed over a distance of about 2 cm. Venous blood flowed freely from the upper end after incision. A probe was introduced, and when followed down a short distance showed firm closure of the sinus and demonstrated the complete destruction of outer wall below. Bleeding was stopped with pressure. At the lower end an opening was found entering the sinus for a short distance and discharging pus. For evident reasons the jugular was not tied. A plastic was made by splitting the posterior wall of the canal lengthwise with incisions downward and upward in the form of a "Y". The canal was packed and a drain placed into the lower end of the sinus, and the wound was dressed as usual. From the pus taken from the mastoid wound, short-chain streptococci developed in pure culture.

The temperature after the operation became normal and at no time rose to 100°. In this case it is seen that the sinus was completely and firmly closed at both ends, and that the thrombosed portion had relieved itself entirely by destruction of almost the entire outer wall of the affected portion.

These cases brought to my mind others in which complete closure was found at one end of the thrombosed sinus,—or even at both ends, in the latter case so firm as to convert the diseased part of the sinus into a tensely filled pus sac.

A number of cases have been reported in which complete obliteration of the sinus by collapse or more probably by organized thrombus, had been observed either during the operation or

after death. Thus Griesinger (Arch. der Heilkunde, 1862) described a post-mortem case of complete obliteration of the entire sigmoid sinus by a firm thrombus. Schwartze (Arch. f. Ohr. Vol. 13, p. 98) published a like case in 1873. Similar cases were also published by Alt (Verhandl. d. Oesterreich Otol. Gesellsch., Oct., 1905); Politzer (Textbook); Baufal (Arch. f. Ohr. Vol. 17). Torök (Arch. f. Ohr. Vol. L, p. 65) reported a case in which there was injury of the sinus during an operation. Six months later, pyemic symptoms; the sinus was exposed and found to contain from the tip of the mastoid to the knee, an organized thrombus of firm connective tissue. At the autopsy the obliteration was found to extend to the torcular. Purulent phlebitis had developed beyond this and had been the cause of death. Gruening (Trans. Amer. Otol. Soc. Vol. XXXV, p. 78) found destruction of the wall of the sigmoid sinus and a peri-sinous abscess and the peripheral portion of the sigmoid sinus converted into a solid cord. Barr (Textbook, 4th Ed. p. 330) in a case of temporosphenoidal abscess found "complete occlusion of the sigmoid sinus, the walls of which were converted into a fibrous cord." Suckstorff and Henrici (Zeitsch. f. Ohr. Vl. XLIV, p. 159) report a case of spontaneous cure of thrombosis; at the autopsy the transverse sinus was found to be completely obliterated by connective tissue. The thrombosis had run a latent course.*

A number of these cases presented fistulous openings in the sinus walls. The nonfebrile course is variously explained, by the aseptic character of the thrombus, by the mild nature of the infection or by the discharge of pus when formed through an opening in the external wall.

We cannot determine with certainty how the obliteration takes place,—whether by direct organization of the thrombus without its disintegrating, by emptying of the pus formed through the outer wall or by collapse and agglutination of the walls.

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*A number of cases are reported of thrombosis running a nonfebrile course in which obliteration of the sinus took place.

Alexander. Arch. f. Ohr., Vol. 64, p. 89.
Uchermann. Arch. f. Ohr., Vol. 72, p. 263.
Blau. Arch. f. Ohr., Vol. 74, p. 200.
Nager. Zeitsch. f. Ohr., Vol. 53, p. 162.
Voss. Zeitsch. f. Ohr., Vol. 53, p. 316.
Uffenorde. Monatssch. f. Ohr., Vol. 41, p. 661.
Wild. Zeitsch. f. Ohr., Vol. 57, p. 247.
Seidler. Arch. f. Ohr., Vol. 81, p. 177.
Bendi. Monatssch. f. Ohr., Vol. 43, p. 641.
Buys. Arch. Internat. de Laryng., Vol. 27, p. 127.
Welty. Calif. State Journal Med., Feb., 1908.
Auerbach. Laryngoscope, Dec., 1912.

A large number of cases bearing marked similarity to those reported by me are to be found in our literature. Hoffmann, (Arch. f. Ohr., Vol. XLV, p. 131), reports one case in which the central and peripheral ends of the thrombosed sigmoid sinus at the operation were found to be closed by connective tissue. He reported another case of connective tissue obliteration of the sigmoid sinus (Arch. f. Ohr., Vol. L., page 76), in a child with extensive defect of the inner wall of the mastoid process and extradural abscess. On splitting the sinus, it was found firmly closed by organized thrombus with but a little of the lumen retained. The fever subsided immediately. Wernicke (Arch. f. Ohr., Vol. XLVIII, p. 197), found the sigmoid sinus converted into a 2.5 cm. long and 1.0 cm. wide abscess, completely shut off above and below by organized masses. (I have published a similar case.) In a second case the obliteration existed only toward the central end. These cases were cured by operation. Wernicke gives a complete bibliography of the early cases up to 1900. Streit (Arch. f. Ohr., Vol. LVI, p. 212), reports a case of spontaneous cure of thrombosis by obliteration of sinus. There were no symptoms of sinus thrombosis. The operation was done for mastoiditis and exposed a cavity whose inner wall was covered with granulations and was found to be the obliterated sinus. Hölscher (Bresgen's Zwang. Abhandl., Vol. VI, 1902), reports one case in which all symptoms of thrombosis were absent, while in the second, there were rigors and swelling in the neighborhood of the emissary vein but otherwise only headaches and slight evening temperature. On opening, a perisinus abscess was found; the sigmoid sinus was absent in both cases, being replaced by granulation tissue which passed over directly posteriorly into the normal sinus. He reports a third case of death from cerebellar abscess without symptoms of sinus thrombosis; no sinus was found at the operation. At the post-mortem, the transverse sinus was found enlarged from torcular to knee and from this point on completely closed by a firm thrombus. Barany (Monatssch. f. Ohr., Vol. XLIII, p. 790) describes a case of spontaneous cure of sinus and bulb thrombosis. The case was one of mastoiditis with extensive sub-periosteal abscess. On opening the mastoid, the sinus and dura were found extensively exposed, greatly thickened and in the neighborhood of the bulb a black opening was found in the sinus through which a sound could be entered for a short distance in both directions. The sinus was thin and obliterated. Recovery took place without further operation.

In the discussion Urbantschitsch stated that he had demonstrated a similar case of cured sinus thrombosis with obliteration of the lumen. On exposing the sinus in a case of putrid cholesteatoma, a tablespoonful of foul green pus was discharged; the wall of the sinus which was discolored was slit up; the whole sinus was found filled with non-purulent thrombus masses. Toward the sinus transversus, the sinus walls were completely adherent to each other. (Monatssch. f. Ohr., Vol. XLIII, p. 182.)

Recent experimental studies of this subject have brought interesting results. Haymann (Arch. f. Ohr., Vol. 83, p. 1, 1910) was able to produce and study sinus thrombosis and pyemia in dogs and monkeys. Among his conclusions the following are to be specially mentioned:

The thrombi in their earliest stages may contain micro-organisms or the latter may enter the thrombi subsequently from without or be brought to the thrombi by the blood stream. The number of organisms contained in the thrombus vary greatly, but the ends of the thrombus are usually most benign. A moderate number of organisms does not prevent organization of the thrombus. Experimental infected thrombosis shows a marked tendency to spontaneous recovery—and even malignant forms, in which the outer wall was destroyed, at times showed organization, vascularization and recanalization of the sinus. In a subsequent paper Haymann (Muench. Med. Woch., Vol. LVIII, p. 2443, 1911) considers the processes tending to the spontaneous cure of sinus thrombosis in man. He reports a case of purulent otitis media for a year with death from meningitis. The sigmoid sinus was obliterated throughout a large part, completely closed by firmly organized connective tissue with distinct evidence of beginning recanalization, a condition similar to his findings in experimental thrombosis. He insists that the thrombosis must not be looked upon as non-infected because of the spontaneous recovery, though the infection may not have been very virulent. This conclusion is supported by his experimental observations. This is the first case in which histological proof is brought of complete spontaneous cure of sinus thrombosis of otitic origin. He refers to the case of Miodowski (Arch. f. Ohr., Vol. 74, p. 335) in which there were similar findings—but points out that though the jugular and sinuses were thrombosed, the infection was from a cervical gland and therefore not otitic. He concludes that processes tending to spontaneous recovery in sinus thrombosis in man are

not of rare occurrence. The recovery may be so complete that recanalization is established.

Voss and Haymann have emphasized the importance of these processes in their practical bearings. Voss (Zeitsch. f. Ohr. Vol. 53, p. 316) in a paper bearing the startling title "Lasst den Thrombus in Ruh," warns against the removal of the thrombus with the sharp spoon:—he points out that the entire outer wall of the diseased part should be carefully removed, and he only incises the thrombus. The practice to leave the firm ends undisturbed would appear to be in accord with the experience which the cases described and referred to, afford. A source of danger which must be emphasized, is that of incising the collapsed sinus or the inner sinus wall when the outer wall has been destroyed,—with the intent of opening the sinus. Thus Grunert and Dallmann (Arch. f. Ohr. Vol. 65, p. 127) reported a case in which the sinus became obliterated after injury during operation, and an incision through the fibrous cord passed directly into the cerebellum. In another case, Uchermann (Zeitsch f. Ohr. Vol. 46, p. 313) in this manner opened a cerebellar abscess by incising through a collapsed lateral sinus. And Herzfeld (Zeitsch. f. Ohr. Vol. II, p. 141, 1909) had a similar experience in a case of cholesteatoma. He opened into a sinus, the outer wall of which was covered with granulations and incised directly through the obliterated sinus into the brain. The patient recovered.

The firm closure of both ends of the thrombus with breaking down in the middle is less apt to lead to metastasis and general infection. But as Hessler (Otitische Phaemie, p. 274) has shown, the advantage is not entirely on this side, for those cases in which general infection occurs are less apt to develop cerebral abscess and meningitis and vice versa.

Another, though remote source of danger was pointed out by Hoffmann; namely, that an organized thrombus may subsequently disintegrate and lead to grave results. (Verhandl. d. deutsch. otol. Gesellsch. 1897, p. 132). Brieger (Zeitsch. f. Ohr. Vol. V, p. 29) reported a case of such reinfection of a healed sinus and jugular thrombosis.

We are warranted in concluding that the course of a thrombosis varies according to the virulence of the infection and other influences. The thrombus may become organized without disintegration, and the lumen may even become re-established. But even in those cases in which it becomes purulent in its central part, the firm closure of both ends and the formation of a fistula or the

entire destruction of the outer wall may permit its more or less successful drainage and thus tend to its spontaneous cure. This process in its nature is the same that takes place in every case in which conditions are brought about by operation which permit the formation of a non-infected thrombus at both ends of the infected portion of the sinus. It is apt to be incomplete when spontaneous, since the anatomical structure of the temporal bone places many obstacles in the way of its complete and easy drainage.

DISCUSSION.

Dr. Henry O. Reik, of Baltimore, said that the careful observations that Dr. Friedenwald has made upon these cases and the interesting report given us constitute an important contribution to the literature of lateral sinus infections. To those of us who remember the time when exposure of the lateral sinus was looked upon as a very serious operation and when most surgeons dreaded that they might accidentally see it some time in the course of an operation upon the mastoid, it seems perfectly clear now that there must have been a good many cases of lateral sinus thrombosis that got well without further treatment than drainage of the mastoid cells. As we review old case histories we find plenty of clinical evidence of involvement of the sinus, whether simply a phlebitis or a partial or complete thrombosis, of course we cannot determine, and, a certain number of them got well. Of course, this fact would not justify one today in neglecting the proper surgical treatment whenever the diagnosis is made. But the point of great practical importance in the paper, perhaps, is the support which these cases lend to the old commendation to avoid meddlesome surgery in this region. The point made in opposition to efforts at removing all of the clot from the vessel, until free bleeding is secured at both ends, is well taken. I came to the conclusion some time ago that this was not only unnecessary but dangerous. With the mastoid disease cleared away, the jugular ligated and the sinus opened to provide efficient drainage from the infected area, there is no occasion for probing further.

Dr. Ewing W. Day, of Pittsburg, Pa., had had three cases, two of which he had reported at the last meeting of the Society, in which the patients, suffering from old chronic otitis media, sought relief from pain, and in which the symptoms simulated those of abscess. The sinus, upon operation, was found to be not obliterated, but was thoroughly organized, hard and dense, as it had probably been for years. He dug out all the hard tissue down to the torcular. This year he had encountered the third case, in a child who had had scarlet fever. Another child in the family had developed mastoiditis. The mother remarked that the first child had a discharge from each ear, and was not doing very well. There was no elevation of temperature in this case, but the child looked starved. It was sent at once to the hospital and the mastoid opened, with the discovery of very offensive pus. Laboratory examination showed that this pus was sterile. The sinus was lighter than normal. The diagnosis of sinus thrombosis was made, and the sinus was found to be filled with organized, soft tissue, which had not become firmly hardened. He found that the child had been very sick, running a temperature of from 105 degrees to 106 degrees F., with chills. Nature had thoroughly controlled the clot, so that it did not look like a clot at all. It probably had been streptococcus infection, from the fact that the child had had scarlet fever.

Dr. Lee M. Hurd, of New York City, in discussing Dr. Friedenwald's paper, reported the following case:

"Man, 27 years. Four months ago, severe pain in ear, three days. D. M. incised, followed by relief of pain and profuse discharge. About every four to seven days thereafter, discharge became scanty with intense pain, nausea, vertigo, chills, fever, and sweats. For six weeks before operation, pain in mastoid with shooting pains over parietal region. Examination: Slight discharge D. M. Int. wall markedly bulging, some antral tenderness. T. P. normal—septic appearance. Op. cortex, normal, thick, and hard—cellular necrotic—small antrum above tymp. Necrosis and granulations extended upward and backward above sinus, where an epidermal abscess was formed, one-half inch in diameter. This did not extend over lateral sinus. The sinus wall was thick and cord-like, and was about four times normal thickness, and was white and fibrous on incision. The endothelium appeared normal. No evidence of clot. The thickness of sinus wall so diminished its calibre as to prevent flow of blood. The interior was dry, except for slight flow from superior petrosal sinus. From the knee, the sinus was open about an inch in both directions before a flow of blood was established and no clot found."

Dr. James F. McCaw, of Watertown, N. Y., cited a case, reported before the American Otological Society, similar to that mentioned by Dr. Hurd. The patient, a girl fourteen years of age, who was brought to him with a history of a prolonged attack of measles, with persistent discharge from the ear, running a temperature for six weeks, and with all the symptoms of mastoiditis. She looked septic, and had a temperature of 103 degrees F. He performed the ordinary mastoid operation. When he came down upon the lateral sinus he found the entire outer wall completely destroyed and the cavity filled with pus, the distal and proximal ends of which were completely walled off by a firm thrombosis. He did nothing to this, but opened up and packed as in the ordinary mastoid operation. The result was excellent. In cases of this kind, without symptoms of general sepsis or sinus absorption, there is no need to destroy what nature has already accomplished. In this case nature has already done all that one could hope to accomplish in an operation on any thrombosed sinus. He cited another case, reported before the American Otological Society last year, in which he opened the mastoid, left the sinus intact, and obtained an excellent result. Such cases should be watched and the blood count taken, the value of which had been shown by Sondern.

LABYRINTHITIS WITH ILLUSTRATIVE CASES.

[An attempt to express in teaching form the mental processes of the attending otologist.]

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So much has been written about the theoretical aspects of the labyrinth, and diseases thereof, that there is danger of the real and immediate demands upon the clinical otologist being submerged under a mass of literary opinions which may well leave him in a nebulous haze of confused ideas. It will be my endeavor in this paper to formulate some of the more simple and practical problems in relation to disease of the labyrinth, with which the clinical otologist is more or less frequently confronted. It is not within the province of this article to discuss the more theoretical and abstract propositions, which are of so much interest to us all, and the solution of which will ultimately benefit the profession and suffering humanity, but our attention will, rather, be confined to the consideration of the well recognized clinical manifestations of labyrinth disease, and more especially, as they are observed in every day practice. When these cases present themselves we are not always fully prepared to give them the intelligent attention they need. This is due to a confusion as to the relative importance of the clinical phenomena, and the theoretical problems which are usually considered in the discussion of these cases. While the theoretical problems are of importance in the analysis of these cases the clinical aspect must ever be given the greater attention if we wish to be of the greatest service to our patients.

The consideration of a few typical cases may help some of us to "get a line" on this disease, to the extent that we may at least give those thus afflicted, intelligent advice, rather than evasive or unintelligible advice, such as was given by an otologist who said he operated upon a labyrinth to improve the hearing!

The type of labyrinth disease more often, and easily recognized, is characterized by the total destruction of hearing in one ear, which at the time of destruction was either a diffuse manifest suppurative, or a diffuse serous labyrinthitis and in its later manifestation is known either as diffuse latent suppurative labyrinthitis, or as a dead auditory labyrinth from profound serous disease. In simple words these are cases in which weeks, months or years previously

there was a diffuse manifest suppurative labyrinthitis, or a severe diffuse serous labyrinthitis, which caused a total destruction of the organ of Corti of the cochlea, and in addition to this the static labyrinth, semi-circular canals, ampullæ, and cristæ ampullaris was wholly destroyed if the disease was suppurative or was partially destroyed if the original disease was a serous labyrinthitis. A fistula communicating with the tympanic cavity usually remains in either type of disease.

These cases seek advice as to their defective hearing, or in reference to attacks of giddiness, chronic otorrhea, etc. The problems are, What can be done to either relieve or cure the remaining disease? Is his health or life endangered? If so, what can be done to improve his health or prevent death? These are the problems confronting the otologist. He is not at first so much concerned with the refinements of the pathology, or the theories explaining the various reactions of the tests of the labyrinth, as he is with the immediate needs of his patient.

The author has selected typical cases from his practice to illustrate the clinical aspects of labyrinthitis and he hopes to present them as individual problems to each reader. As each case is presented he will endeavor to formulate the mental problems presented in its analysis. By this method of presentation he hopes to put the consideration of labyrinthine disease upon a simple clinical basis suited to the embryo-labyrinthologist rather than upon a complex and often confusing laboratory basis, which is only available to the more advanced observer. In short, this paper is addressed to those otologists, who, while they have a general knowledge of the disease, and the tests applied in its study, do not pretend to have a clear understanding of all the more complex and theoretical problems involved in their consideration. Once they are able to recognize cases, they can study the mat first hand, and thus gradually familiarize themselves with the clinical and theoretical problems presented by them.

Case 1. Mr. F., age 46 years. Consulted me March 6th, 1912, complaining of deafness in the right ear, from which there had been a chronic discharge for ten years, at which time he had an attack of acute tonsillitis, followed by a severe inflammation of both ears, followed by a discharge of purulent matter. During the acute attack he became nauseated, and vomited when he attempted to move about. Was confined to his bed for several days. He was giddy when upon his feet, and had to be supported to the toilet room. The walls of the room seemed to whirl about

him, though in what direction he does not remember. He was quite deaf in the right ear, at that time, and has remained so since then. Has had numerous giddy attacks since the right ear was destroyed, though he has never fallen to the ground during one of them.

At the time he consulted me he was complaining of giddiness, deafness in the right ear, and a thin sero-purulent discharge from the same ear. Had recently passed through an attack of acute coryza, which he thought brought on the giddiness and increased the discharge.

The first problem presented in this case was, Is the patient totally deaf in the right ear, or is he only partially deaf? As the solution of this problem would determine the general character of the diseased process in the right ear, it was important to determine at once whether or not the patient was totally deaf in the affected ear. Total deafness rarely, or never occurs in adhesive processes in the middle ear, or in otosclerosis. It only occurs in diffuse suppurative labyrinthitis, diffuse serous labyrinthitis and in fractures across the petrous portion of the temporal bone, etc. Hence if this case was totally deaf in the affected ear, it would, in view of the previous history point to a complete destruction of the auditory labyrinth during the primary disease ten years ago. At that time he obviously suffered from diffuse serous labyrinthitis, in the fifth or extreme degree, and is at present affected with a dead auditory labyrinth, with bony fistula, and still has some function of the static labyrinth. Had he been affected by diffuse manifest suppurative labyrinthitis ten years ago, both the auditory and static labyrinths would have been totally destroyed. As the static labyrinth still has some function, as shown by the attacks of giddiness, etc., we conclude that his original disease was diffuse serous labyrinthitis.

To determine the question of partial or total deafness was the first problem to be solved. How was this done? To the otologist trained in labyrinth work this question appears puerile. I know some very reputable otologists, however, who, in their present state of knowledge, could not answer it. The methods of observation are often misleading. Only recently an otologist of good standing but who had not fully grasped the labyrinth problem brought a case to my office for consultation. When I offered to test the hearing he exclaimed: "There's no use testing the hearing, as I did it yesterday, and found he heard the watch over the affected ear." I replied that, "I only wish to determine the

degree of hearing," and proceeded to use Barany's noise apparatus to make the test for total deafness, and found the patient to be totally deaf in the affected ear.

The test for total deafness (destruction of the auditory labyrinth) is made with Barany's noise apparatus which consists of a small alarm clock (minus the time element) provided with an ear piece fitting the external auditory meatus. This was tightly inserted into the external auditory meatus of the sound ear of the patient, and pressure upon a button set off the alarm or noise apparatus. This completely shut off the hearing in the sound ear, but did not affect the diseased ear. I then addressed the diseased ear with increasing loudness up to the shouting voice, and the patient did not hear a sound, that is, he was totally deaf on the affected side. This showed total destruction of the auditory labyrinth of the affected ear, or we may say, it showed total destruction of the cochlea of the affected ear. The static labyrinth still retained some function as was shown by the caloric and fistula tests, and by the history of attacks of giddiness.

Having settled the first problem, namely that the cochlear labyrinth was totally destroyed, the next problem was, is the static labyrinth totally or only partially destroyed? The history of recurrent attacks of giddiness showed the static labyrinth (cristae ampullaris) still retained some function. The original disease, therefore, was probably serous labyrinthitis rather than diffuse manifest suppurative labyrinthitis, as in suppurative labyrinthitis both the cochlea and static labyrinths are usually wholly destroyed, whereas in serous labyrinthitis the cochlea may be destroyed while the static labyrinth is left with some function. What were the indications for treatment? Thus far it had not been necessary to resort to any of the so-called tests for nystagmus, or for the "reaction movements," as disturbed equilibrium, etc. A diagnosis of a dead auditory labyrinth with a remnant of the static labyrinth still functionating was arrived at by reference to the previous history, and the use of the noise apparatus. This case is narrated to show that a diagnosis may be made in some cases without any knowledge of the various labyrinth tests, the exact interpretation of which is often the despair of the embryo-labyrinthologist.

What, then, shall be done with this patient? Will local treatment help him, or will it be necessary to operate upon his ear? If operated, what operation? Will a mastoid operation cure the otorrhea? Will a mastoid operation excite the latent labyrin-

thitis, and lead to cerebellar abscess or meningitis? These are some of the secondary problems in connection with this case. All these questions must be answered in the light of past experience. Local treatment will be unavailing as the disease in the petrous portion of the temporal bone, from which the purulent secretion is emanating, is surrounded by dense bony tissue and is inaccessible to local treatment. Chronic mastoiditis was also present and demanded operative interference.

If granulations or polypi are present in the middle ear, they may spring from a fistula of the labyrinth, hence their removal would obviously endanger the labyrinth, i. e., increase the probability of greater, or more active infection within the labyrinth spaces, and thus ultimately cause brain abscess or meningitis and death. Their removal through the external auditory meatus would, therefore, be extremely hazardous.

Will the radical mastoid operation relieve, or remove the offensive discharge? No; as some of it, at least, probably comes from the labyrinth canals, and mere drainage of the mastoid and middle ear would not clear the infection in the labyrinth. In this case I could show serous labyrinthitis had destroyed the auditory labyrinth, but had not totally destroyed the static labyrinth. This is explained by the fact that the auditory nerve and endings is much more easily destroyed than the vestibular nerve and endings. Indeed, the mastoid operation would more likely excite the inflammatory process in the labyrinth, and cause its extension to the meninges, or brain. Safety could only be secured by removing the labyrinth at the same time as the mastoid operation. The hearing was already wholly destroyed, hence the only contra-indication to the labyrinth operation was the likelihood of exciting meningitis by it. This was not likely, however, as in the Jansen-Neumann operation the meninges at the probable site of infection would be freely exposed. The danger usually mentioned was the possibility of injuring the dura. This is not probable if the dura is elevated before removing the petrous pyramid containing the semi-circular canals. In this case the whole of the diseased tissue should be removed, a wide open wound established, and the meninges widely uncovered and drained. Thus operated the patient should be permanently cured of the offensive discharge, and giddiness, and be forever relieved of the menace of cerebellar abscess and meningitis.

Case 1, as referred to in this paper, was operated by me in May, 1912, by the Jansen-Neumann method immediately following the

radical mastoid operation. His recovery was uneventful and the discharge has ceased and giddiness is no longer a factor in the case.

Case 2. Mrs. P., 49 years, Watertown, Wis. I was called to see her on May 19th, 1912, by Dr. Novak, in consultation with Dr. Cook, a resident otologist. Twelve years ago she had a discharge from the same or opposite ear, she could not remember which. Six weeks ago she had acute tonsillitis followed by earache on the left side. Dr. Cook performed a paracentesis upon the left ear, which was followed by a purulent discharge. Four days before I was called in, she was attacked by vertigo, giddiness, nausea, vomiting, and nystagmus to the right. She was prostrated, and movements in bed aggravated the symptoms.

Her condition at the time of the consultation was as follows:

(a) Spontaneous rotatory nystagmus to the right or healthy side; (b) Total deafness in the left ear as shown by Barany's noise apparatus in the sound ear; (c) Fistula symptom absent; (d) The knee reflex on the left side was slightly exaggerated; (e) Babinsky was negative; (f) The pupils were unequally contracted; and the (h) temperature ranged from 101° to 102° Fahr.

The patient was removed to a local hospital where I performed a combined radical mastoid, and a Jansen-Neumann labyrinth operation; time one hour and thirty minutes. The facial nerve was not injured, and the eyes remained turned to the left during narcosis. The patient was in excellent condition at the end of the operation, but died one week later of meningitis.

The first problem in this case was to make the diagnosis. This was not as easy as in Case 1, though it was fairly obvious that it was diffuse manifest suppurative labyrinthitis, complicated by, or immediately threatened with meningitis. The caloric and fistula tests were negative; that is no nystagmatic reactions were induced by them. This was very significant. If the spontaneous nystagmus to the right (symptom (a) in the preceding paragraph) was due to post labyrinth disease (as cerebellar abscess) the caloric test would have induced a nystagmus on top of the spontaneous nystagmus; that is, it would have increased the intensity of the nystagmus if cold irrigation had been used, and would have minimized or overcome it, if warm water had been used. Inasmuch as the labyrinth was destroyed as shown by (a) the complete deafness upon the affected side, and (b) the caloric tests did not change the intensity of the spontaneous nystagmus (because the static labyrinth was destroyed), I made a diagnosis of diffuse manifest suppurative

labyrinthitis, complicated by meningitis. I differentiated it from diffuse serous labyrinthitis, because in the latter disease the hearing is rarely totally destroyed, and either the caloric or fistula test generally causes vestibular reaction, which neither did in this case. Furthermore, meningitis was suggested by the headache, unequally contracted pupils, and slightly exaggerated knee jerk, and severe headache. The antrium of invasion was no doubt through the sheath of the eight nerve, via the internal auditory canal.

The second problem was the indications for treatment.

Obviously local and systemic remedies were out of the question. A general law relating to acute infection, is, that free drainage of an infected cavity will usually result in a cure of the infectious process. In this case the infection was in the tympanic cavity, the mastoid cells, and labyrinth, and probably in the cranial cavity around the opening of the internal auditory canal on the posterior wall of the petrous portion of the temporal bone. To establish drainage of these areas it was necessary to do a radical mastoid operation, and a labyrinth operation which would expose the meninges as deep as the internal opening of the internal auditory canal. Meningitis is as easily cured as peritonitis, provided equally good drainage is established. This is possible at the inception of meningitis in this region, if the Jansen-Neumann operation is performed.

Hence, if the operation is performed early enough a cure may sometimes be expected, as the reported cases show. If, however, the meningeal inflammation has spread much beyond the area immediately surrounding the internal auditory opening a cure should not be expected, as drainage is not fully established. In this case I was in some doubt as to the extension of the meningitis, though the pupils were contracted, the knee jerk slightly exaggerated, and headache severe. There was, however, a possibility of opening and draining in time to avert a fatal issue. I, therefore, decided to do a combined radical mastoid, and Jansen-Neumann labyrinth operation at once. The subsequent development of the case, and the death of the patient, justified my earlier fears as to the extension of the meningitis. This case illustrates the extreme danger of delaying the labyrinth operation beyond the time of the inception of meningitis. Indeed, it would be safer to operate as soon as total destruction of the labyrinth occurs, as shown by the total loss of hearing, rather than to wait for the inception of meningitis. The mortality rate in these cases would be greatly lowered if this were always done. In diffuse

manifest suppurative labyrinthitis the operation should be performed within a few hours after total destruction of the labyrinth occurs. This may be shown with Barany's noise apparatus, as previously mentioned. Spinal puncture would have given positive information as to the presence of meningitis, but this was not done, as a suitable needle was not at hand.

Total destruction usually occurs at the time of the "attack," consisting of nystagmus to the healthy side, giddiness, nausea, and vomiting and disturbance of equilibrium.

Little or no warning of the impending disaster is given. The case, just previous to the attack, was either one of chronic otorrhea or mastoiditis, or of the acute mastoiditis. When the "attack" occurred the hearing should have been tested with the noise apparatus, and if total deafness was shown, and especially if there was no reaction of either the caloric, turning or fistula tests, the labyrinth operation should have been performed at once. Delay only invited danger. The operation could do no harm, as the hearing was already destroyed, and it might have saved the life of the patient. The patient would almost certainly have died without the operation and would probably have been saved with it.

In this connection it should always be borne in mind that total deafness may occasionally occur in diffuse serous labyrinthitis, though the use of the noise apparatus will generally show a remnant of hearing, and static function present in some degree, which differentiates it from diffuse manifest suppurative labyrinthitis in which both hearing and static function are totally destroyed.

Case 3. Mr. Y., age 34 years. Complains of recurring "attacks" of dizziness upon stooping, quick movements of the head, and other unaccustomed movements. He was suffering from one of the "attacks" when I saw him. He occasionally had the "attacks" independent of the stooping or jarring movements of the head and body. The "attacks" were characterized by vertigo, nausea and vomiting, staggering gait, and spontaneous nystagmus. The nystagmus was directed to either side, especially when the eyes were turned in either direction. When looking to the right the nystagmus was to the right, and when looking to the left the nystagmus was to the left. The nystagmus was rotatory in type. There had been discharge from the right ear since childhood. The vertiginous attacks had occurred at intervals for four or five years.

The rotation test showed both labyrinths to be functionating normally. An examination of the ears showed the left to be normal. The right had total loss of the membrana tympani, the malleus and incus. A thin purulent secretion filled the fundus meati. There was no mastoid tenderness, though the skiagraph, subsequently made, showed extreme cloudiness of the mastoid cells, and of the antrum. The hearing was somewhat impaired in the right ear, the whispered voice being heard five feet. Weber lateralized to the right and Rinne was negative. Tinnitus was present but not marked. Fistula symptom was present. The caloric reaction was present about equally in both ears.

The first problem in this case was the diagnosis. This was not difficult in view of the history of recurring attacks of giddiness and nausea upon stooping, and sudden or jarring movements of the head or body. Of much greater significance were the attacks of giddiness, etc., when sitting quietly in a chair, and when reclining in bed. In addition to these phenomena, the positive fistula reaction left no room for doubt as to the nature of the disease. A diagnosis of circumscribed labyrinthitis with fistula was made.

The second problem was the treatment. Should it be expectant, local, or surgical? Inasmuch as the disease was localized and non-progressive, and the hearing intact, operation on the labyrinth was not considered, as the presence of hearing, even in the slightest degree, is a positive contra-indication to surgery of the labyrinth. The mastoid operation remained to be considered. It was obviously indicated in so far as the mastoid was concerned. The influence of the mastoid operation upon the future course of the labyrinth disease was taken into account. Experience has shown that with the proper precautions the mastoid operation may be performed without arousing the circumscribed labyrinth disease into greater activity, or causing it to spread and become diffuse. Without these precautions the mastoid operation might be very dangerous. Having demonstrated the nature of the disease, and that a bony fistula was present, the operator was fully alert to the dangers of the situation, and proceeded with the mastoid operation with full confidence as to the favorable outcome of the same.

The precautions observed were (a) the avoidance of meddlesome probing of the labyrinth fistula, and (b) the avoidance of currettage of the inner wall of the tympanic cavity, especially as granulations were present. Traumatism of the inner wall of the

bony wound was scrupulously avoided. As to the labyrinth nothing was done. The radical mastoid operation was performed and a bony fistula the size of a large grain of wheat was found over the external limb of the horizontal semi-circular canal. A few small granulations surrounded the fistula. One year has elasped since the operation and the vertiginous attacks have been less frequent and much less severe in degree. The probabilities are that the labyrinth disease will remain circumscribed, and the toxic and congestive irritations will cease, and, an ultimate recovery from the "vertiginous attacks" take place.

Case 4. Female, age 23 years, complained of sudden and severe attacks of vertigo, nausea, and vomiting, prostration and of falling to the left. Moving about, and raising in the bed to take food increased the vertiginous attacks. Is very deaf in the left ear. At times the surrounding objects seem to whirl about her to the left, or in the direction of the slow component of the nystagmus.

Upon testing the left ear, with Barany's noise apparatus in the sound or left ear, a remnant of hearing for the shouted voice was shown. Fistula symptom present, but required two or three violent compressions of the air bag to produce it. The caloric reaction in the affected ear was present but weak.

There was a history of several vertiginous attacks during the past six years, though they were of much less severity than the present one. Her hearing previous to the recent severe attack was good. Has had otorrhea with occasional mastoid pain and tenderness for eleven years. Eleven years ago she had an attack of severe tonsilitis which was followed by acute otitis media, which eventuated in chronic otorrhea, which has been accompanied by the aforesaid vertiginous attacks at varying periods of time.

The first problem in this case was the diagnosis. In view of the fact that deafness, while profound, was not total, and that there was a history of recurrent vertiginous attacks of moderate degree of severity during the preceding eleven years, that fistula symptom was present, that no previous operation had ever been performed upon the left ear, and that the present attack was severe, and attended by almost total deafness, I made a tentative diagnosis of diffuse induced serous labyrinthitis. Had diffuse suppurative labyrinthitis been present the deafness would have been both sudden and complete. The presence of some hearing and

static function in the affected ear ruled the diffuse manifest suppurative labyrinthitis out of consideration. The only other type of labyrinthitis of otitic origin, as this obviously was, attended by almost total deafness of sudden development, is the serous variety.

Hence our tentative diagnosis was to this effect. If the case was of the diffuse serous type the hearing would gradually be restored, an occurrence which could never happen in diffuse manifest suppurative labyrinthitis.

Within five days the vertiginous symptoms had disappeared and within two weeks the hearing was restored to such an extent that the whispered voice could be heard at three feet. There remained no longer any doubt as to the serous nature of the labyrinthitis.

I could narrate several other cases illustrating the various types of labyrinthitis, and the varying etiology of the same, but the limits of this paper forbid. Furthermore the chief object of this paper is to illustrate the mental processes of the clinician in the presence of labyrinthitis, rather than to report a series of cases. During the past year I have had nine cases of labyrinthitis, though perhaps one of them should not be classified under this category, as the destruction of the labyrinth was due to a fracture through the petrous portion of the temporal bone. The skiagraphs of this case were very interesting, as they showed extensive fracture of the frontal bone, and through the petrous portion of the temporal bone, and that there was no depression of bone. The patient made a complete recovery in three months, though he was unconscious for four days. (Exhibits skiagraphs).

DISCUSSION.

Dr. Wendell C. Phillips, of New York City, was especially interested in Dr. Ballenger's case because, in the present state of knowledge concerning labyrinthine disease, our opinions may not stand the test of time, and it is only by means of a large number of detailed cases that anything like definite knowledge can be obtained concerning the individual cases encountered. Up to a year ago otologists relied largely upon the Vienna school for knowledge concerning this subject; now, however, many are unwilling to agree to the correctness of the position of this school in all respects. In the first case reported by Dr. Ballenger, in which the radical labyrinth operation was performed, he would not have operated. Whatever ramifications the disease had reached in this case were reached years ago, and nature had limited the extent of the disease. The patient had a fistula. It was a case of chronic suppuration of the middle ear, with extension to the semicircular canal. There was no opening in the membranous labyrinth or there would have been destruction of the static labyrinth. He would

have done a radical mastoid operation, leaving the labyrinth alone. He prophesied that within the next two years Dr. Ballenger will report having ceased to operate in this class of cases.

Dr. O. A. M. McKimmie, of Washington, D. C., cited a case, reported before the American Otological Society, in which the patient had been under his observation from time to time for eleven years, first for chronic suppuration of the middle ear, then for progressive destruction of the ossicles. She was not under his observation for eight years, when she returned with the middle ear filled with granulations. These were removed. She passed out of his hands for the summer. She had an attack of dizziness lasting five days during the summer. After thorough cleansing of the ear, he found a fistula on the promontory of the internal wall. Static symptoms were negative upon testing. She was completely deaf. The ear was treated and at the present time she is entirely well, with no evidence of disease, and has compensation. The ear has been dry since last December. Where nature has walled off the paths to the brain, it would seem best not to interfere. He would not operate upon that class of cases.

Dr. Samuel J. Kopetzky, of New York City, in discussing Dr. Ballenger's paper, said, in connection with the second case reported by Dr. Ballenger where operation was performed in the face of intracranial symptoms and which resulted in death, it permitted him to draw the lesson that it is dangerous to perform any sort of operation on the labyrinth when that organ is acutely infected, if it is at all possible to postpone the procedure until the acute stage is passed. When the acute symptoms have subsided, treatment may be confined to the radical mastoid operation, and the labyrinth may or may not need surgical intervention. If one must operate in the presence of acute symptoms, then both the radical mastoid operation and the labyrinth operation must be done at one and the same time, and it is well under these circumstances to make a wide exposure of the dura during the procedure.

Dr. R. Bishop Canfield, of Ann Arbor, Mich., called attention to the difference of opinion regarding the pathological conditions going on in the labyrinth. It has frequently been stated that there may be pus in the labyrinth. He did not agree with this. When the labyrinth is opened, there is free bleeding, and the labyrinth is found to be filled with granulation tissue. Neumann has stated that he has never seen pus in the labyrinth. In one case there was empyema of the internal cistern. In two labyrinthine operations, the speaker had seen excessive loss of cerebrospinal fluid after the operation, and when the dressings were done, for a week in one and ten days in another case.

Dr. Stucky, of Lexington, said he had had some rather embarrassing experiences in what he supposed to be cases of labyrinthitis. He was convinced, as perhaps many of you are, that the last word has not been said regarding the operative treatment of suppurative labyrinthitis. After attending very closely and very strenuously Norman's class for two weeks, seeing him perform on the cadaver, and on the living person, his operation, he had a great deal more enthusiasm then than I have now.

Suppurative labyrinthitis he believes to be very rare. Serous labyrinthitis is not so rare. Of course, the test that is to guide us more than any other test is the total destruction of hearing. Is the hearing in the affected ear completely destroyed? He believes that Dr. Ballenger's paper has done more to simplify this still difficult subject than any paper he has heard. There are so many other causes for vertigo, dizziness, etc., besides labyrinthitis, and he has seen most discouraging results in three cases, where the operation of opening the labyrinth was performed,—such discouraging results he hesitated

a good while before resorting to that operation. He has had the same symptoms clear up after doing a thorough, complete, radical mastoid operation. A great deal depends upon the condition that we place the patient in, regarding his power of resistance. If the blood count shows a low leucocytosis and a high polynuclear percentage, that patient is saturated with urotropin quickly, given as high as 30 to 60 grains the first dose, then 10 grains every three or four hours thereafter until we have given two drams of the drug.

He believes he is still more and more inclined to do the radical operation with as little jarring, traumatism and chiseling as possible, and then waiting to see what is going to happen. If, then, we have the increasing meningeal symptoms, your patient is right under your observation,—then he believes we are justified in going further.

Dr. Roy, of Atlanta, Ga., said: I did not hear all of the Doctor's paper, and I do not arise with the idea of discussing the same, but it is on the idea of reporting a case on this line that recently came under observation which, to me, was a rather unusual case. It was about a year ago I was called by a general practitioner and asked to see a lady who had been in bed for several weeks with considerable dizziness She had been treated for stomach trouble for a number of months and was not able to come out. He thought there might possibly be something the matter with the ears. I found the lady in bed. She was very anemic and weak, only weighing about ninety-six pounds, when usually she weighed about one hundred and fifteen or twenty. She seemed to have very little vitality and could scarcely sit up. The dizziness was so severe they had to prop her up. I examined her ears and found from her history that she had had a discharge ever since she was a small child, which would heal and then there would be a return of the discharge. About two weeks before she had taken to her bed both ears had been discharging previously and both ears were affected) the left ear had been discharging. In one ear there was a profuse muco-purulent discharge, and just a little moisture in the other, with broken down epithelial debris, showing both ears had been damaged. The hearing in each ear was by no means lost. In fact, she heard a whispered voice—a forced whisper—a stage-whisper, as they sometimes call it—about four feet from each ear.

I put her upon tentative treatment of syringing the ear until she became a little stronger, and on increasing doses of iodide of potassium. She seemed to get along very well and gradually improved. My associate. Dr. Craig saw the patient and reported the condition as seemingly some better than when I had first seen her. This treatment was continued for three or four weeks, with continued improvement, and in three weeks she was able to come to the office with the assistance of her mother and another friend, who brought her on the street car. She walked between them. Otherwise she would have fallen. I made the examination and found the condition almost as it was on the previous visit.

I kept this woman under observation and decided not to operate, although there was an indication that there was a certain amount of necrotic bone and that the labyrinth was involved. I kept her on the iodide of potassium and on the conservative local treatment, and six months ago everything seemed to begin to clear up. I saw her about a week ago. She has gained about twenty pounds, has no dizziness, the ears are perfectly dry, and there are no symptoms whatever of any internal ear complications, and I feel this is certainly a case where the large majority of the men would have operated upon the internal ear.

Dr. Jervey, of Greenville, La., said: . I would like to add a word in regard to what Dr. Stucky has said in regard to the Doctor's paper. I have read a great many authorities on this complicated subject. My

experience with it has been practically nothing, so far as I know, but I do want to say that the paper that Dr. Ballenger has read is the most noteworthy contribution, from a practical standpoint, that I have ever had the pleasure of listening to, and reduced to the simplest possible terms. I think there is not a man here who was not glad to hear the paper as read by Dr. Ballenger. I think many are in my shoes in this respect: we know too little about this important subject; and I want to take occasion to thank the writer for presenting the paper to us.

Dr. Ballenger in closing said he had great sympathy and complete understanding of any one who gets upon his feet and makes inadvertent statements in reference to labyrinthitis. I have made similar mistakes. So I am fully in sympathy with any one who will make a statement in regard to what those who are supposed to have full information might or might not do under certain circumstances; hence, if, in any remarks I may subsequently make, I appear to criticise or correct any statements made by any of the speakers, it will be with the understanding that I have made just such mistakes myself.

Suppurative labyrinthitis, Dr. Stucky has said, is rare. It is so common that I have seen about nine cases in one year. I do not believe it is a rare disease. If you will get a Baranay's noise apparatus or some similar instrument and test every case of deafness that comes into your office, you will find several cases in the course of a year. The cases, as you often find them, are in the latent stage. I only saw one in the acute manifest stage in a year, the others were in the latent stage, the labyrinth destroyed, leaving a suppurative fistula.

Dr. Stucky says there are other cases of deafness, staggering, etc. So there are, but it is very easy, with a little application, to learn to differentiate between the staggering gate thus caused and the various types of labyrinthitis. It takes some application to differentiate the various types of nystagmus and you can more easily determine whether it is one of otitic or cerebellar origin or some other origin. Of course you must have a clear understanding of the various types of nystagmus because they do not have the same significance. Involuntary movements of the eyes do not necessarily indicate a labyrinth disease. The nystagmus must present the otitic type, a slow and a quick component and a gradually diminishing intensity. Ocular nystagmus is very different, after a little study, in determining whether he has a case of labyrinth disease or not.

Dr. Stucky also said he has had cases clear up after the mastoid operation. I do not know exactly what he meant by that.

Dr. Stucky: Clear up and get well.

Dr. Ballenger: *The symptoms, I mean. If a man has diffuse suppurative labyrinthitis the hearing is totally destroyed. I stated in my paper if it was not totally destroyed then only the mastoid operation should be done: one should not dare to operate upon a labyrinth that has a remnant of hearing left. (This answers Dr. Roy also). We do not recommend in any great medical center,—I think, Chicago, New York, Berlin and Vienna, that any labyrinth be operated upon unless there is total destruction of hearing, and, with a total destruction of hearing, what harm can the operation do? The operation is not so formidable after you learn how. Like all major operations the safety lies in the knowing how. It is presumed that you would not do a mastoid operation without you knew how, and it is not difficult to learn how. You have to protect the meninges and not injure them by careless or non-understanding technique. The greatest difficulty in the

*This paper was also read before the Middle and Southern sections. The discussion which appears covers both sections.

labyrinth operation is to avoid injuring the facial nerve. I can not see where the objection to the labyrinth operation comes in. The operation is all on the side of safety. All you have to do is to chisel out the petrous portion of the temporal bone by a technique which is simple and clearly described. I do not believe it is a good idea to give out the impression that certain men operate upon every labyrinth case that they come across. That may have been true some sixty years ago, but I do not think it is true to-day. The tendency is to operate only when there is absolute, total destruction of hearing, and in the acute manifest suppurative cases, at once, if it can be shown that total destruction of hearing has occurred. Some will get well and live if you do not operate. My nine cases seen last year were (all but one) cases that were acute manifest cases of years standing, suppurative labyrinthitis that continued to live without operation. That is, they are still discharging pus more or less, but they are still living; they did not develop meningitis. Indeed, some of the living cases with complete destruction of hearing are the sequellae of serious labyrinthitis, hence the absence of meningitis and death. But a good many of the cases that were not operated upon developed meningitis and died. They might still be living had the labyrinth been operated.

We would add to the number of the living if we could operate upon these cases understandingly. The fact that some live without operation is no proof that the operation is not necessary. That is true of the mastoid operation. The patients do not want that nasty discharge all their lives. As soon as we do the labyrinth operation with the knowledge that by so doing we prevent them from having brain abscesses, meningitis, etc., our results will be improved. So we operate, not because we think all are going to die, if we do not operate, but because we think many more will live if we do operate. And we have to operate before meningitis sets in, and it does set in very often. We have cases of meningitis in mastoid disease that die. If we had tested them to discover the moment total destruction occurred and had operated, some of them would still be living. Some get well in spite of the fact that we do not operate, but more would get well if we would operate. I did a radical mastoid operation eleven years ago on a boy, and nine years after he died of meningitis. He was totally deaf in the affected ear at the time I operated. He had at that time, (although I did not recognize it), a suppurative manifest labyrinthitis. That was followed by the latent type. It simply continued to discharge through the external meatus, and later extended to the brain, and he died. Had I recognized the disease and done, at that time, a labyrinth operation, that boy would be living today.

It is not a question of a few cases getting well because you do nothing, it is how many more would get well under operation.

Dr. Stucky says he would rather wait. We should all wait until total deafness occurs before operation on the acute type. In the latent type in which the hearing is already destroyed, and are running around with an otorrhea, we can wait until a mastoid operation is indicated and then operate the labyrinth in connection with the mastoid operation. If they have severe attacks of giddiness and are prostrated from time to time, that means the state labyrinth was not wholly destroyed in the primary serous labyrinthitis. If the giddiness gets so pronounced they cannot work, they should operate the labyrinth. Any one who is well informed who does not operate upon an ear that has a remnant of hearing, unless he has mastoid disease or dizziness and giddiness which interfers with occupation or endangers the life of the patient.

ACUTE PHLEGMONOUS EPIGLOTTITIS.

By M. D. LEDERMAN, M. D., New York, N. Y.

Acute phlegmonous epiglottitis is an infectious process involving the submucous structures of the epiglottis and contiguous tissues. In the four cases which came under my observation, suppuration accompanied the inflammatory syndrome.

The disease is characterized by a sudden onset with distinct local manifestations. A seemingly normal person experiences a sharp pain in the throat, accompanied by painful deglutition and a sense of fullness or obstruction in this region. The act of swallowing soon becomes an effort and the patient is very uncomfortable and distressed. The voice is indistinct and guttural. These symptoms rapidly progress and may assume a serious aspect in a few hours.

At times the attack is ushered in with a chill, followed by a rise of temperature. Headache, nausea, and general malaise may accompany the other symptoms. The course of the temperature is not regular. It is highest at the invasion, falls abruptly as the process improves, and again ascends if complications arise. The pulse does not show much irregularity, but is weak and compressible.

On inspection, the pharynx appears normal or slightly congested. Further examination shows an enormously swollen epiglottis. It is dusky red in color, three or four times its natural size, and so obstructs the laryngeal orifice that it is impossible to obtain a clear view of that cavity. In all my patients, the edema extended to the aryepiglottic folds. In two instances this infiltration was so marked as to cause difficulty in breathing. One woman was brought into the Lebanon hospital in an ambulance in a cyanotic condition. In none of the cases was there any history of previous throat infection.

In this affection the edema is usually limited to the oral surface of the epiglottis, and does not extend to the laryngeal side of the cartilage. It rarely reaches the interior of the larynx. There is an anatomical reason for this peculiarity. Schnitzler (1) states that the submucosa of the lingual surface of the epiglottis is loosely attached, while that of the laryngeal side is closely connected to the cartilage, except in the region of the nodule. Fur-

thermore, the submucous cellular tissue of the epiglottis extends unbroken to the lateral walls of the pharynx and to the base of the tongue, thus accounting for the infiltration at this site in these cases and in infectious diseases of the tonsil and tongue.

While edema of the ventricular band is sometimes present, we seldom see a serous extravasation of the true cord because of its closely attached musculature.

Acute edematous diseases of the epiglottis and larynx is rarely seen in children. In a series of 245 cases collected by Sestier (6), only twice did the affection occur as a primary lesion.

Our colleague, Clement F. Theisen, called attention to acute infection of the epiglottis some years ago, in his very instructive report of three cases of angina epiglottidea anterior. The attack came on suddenly, with elevation of temperature and symptoms associated with an acute septic process. In all the cases there was considerable edema of the anterior surface of the epiglottis, and in two of them the aryepiglottic folds were involved. The subjective symptoms were similar to those I have mentioned. No purulent secretion followed the surgical treatment. Nevertheless, the bacteriological examination of the exudate showed the presence of a mixed infection (staphylococcos and pneumococcus, and streptococcus and pneumococcus). These examinations were made from the secretion taken from the deeper tissues immediately after the infiltrated submucosa had been sacrificed and were not surface contaminations.

In two of my cases the same micrococci were found in the purulent discharge, therefore such cases should be considered acute primary infections. That this disease is not of recent origin is shown in Theisen's article, where he refers to a case reported by Mainwaring in 1791, showing all the typical symptoms.

The infiltration that follows the invasion of any pathogenic bacteria may be either serous or purulent in character.

In commenting upon the origin of septic infections of the throat, Semon calls attention to the conclusions of Dr. Max Jordan's (4) investigations on "The Etiology of Erysipelas." Jordan states: (1) There is no specific pus microbe. Together with the streptococcus and staphylococcus, there are a great number of bacteria which will cause suppuration. (2) That pyogenic micrococci can produce all forms of inflammation besides the purulent variety. Semon further says that in these acute septic lesions, though they differ somewhat in their appearance and location, pathologically they are identical and only differ in their

virulence. Furthermore, it is absolutely impossible to differentiate between the edematous and the purulent types of the infection.

In considering this phase of the disease, Theisen quotes the observations of Welch, who found that when the pneumococcus of the edematogenic variety (diplococcus lanceolatus) was injected subcutaneously into the tissues of some of the lower animals, it uniformly produced extensive local subcutaneous edema. He expressed the opinion that the pneumococcus was a factor in the production of the edema in his cases.

That certain regions are primarily attacked is probably due to a break in the continuity of the mucous membrane, thus permitting ready entrance of the pathological factor. When we consider the numerous forms of bacteria constantly present in the cavities of the upper air passages, it is surprising that we do not encounter more cases of these serious infections. The tissue resistance must be very great.

In the cases herewith reported, there were no distinct etiological factors to account for the infection of the epiglottis except in one instance. This patient had been in a sanitarium three years before for the treatment of pulmonary tuberculosis, but was discharged in good condition. Three of the patients were females, and the other was a young man. All recovered.

Case 1. This case has been previously reported. A young married woman, twenty-five years of age, retired in good health. At seven o'clock the next morning, she was suddenly wakened by a sharp pain in the throat, which persisted throughout the day, being much aggravated by swallowing. A feeling of fullness in the throat, with pain in the right ear were also experienced. Severe headache, pains in the back and limbs, chilliness, nausea and vomiting were accompanying symptoms. The temperature at three P. M. of that day was 104°, pulse 90. Nothing abnormal was seen in the pharynx at that time by the attending physician. Twelve hours after the onset, a further examination was made by a laryngologist who found the epiglottis very edematous and partially hiding the laryngeal structures, which, however, were normal in appearance. Local treatment was instituted, and free purgation. Ice was applied externally and internally, the larynx was sprayed with adrenalin and cocaine solution, and the epiglottis was painted with a 50 per cent. solution of argyrol. The edema gradually increased during the night, and an area of in-

duration appeared on the lingual surface of the epiglottis near its base on the right side. The serous infiltration had spread to the adjacent pharyngeal wall, base of the tongue, and aryepiglottic folds. The next morning at eight o'clock, I saw the young woman in consultation. She was resting upright in bed, had an anxious expression, and spoke in a guttural voice with considerable difficulty. A constant effort to clear the secretion from the throat was noticed. Respiration was embarrassed, and the patient gave the impression of being very ill. She remarked that the lump in the throat felt much larger than on the previous day, and that deglutition was extremely painful and difficult. Dr. Barnert, who was in attendance, stated that the local condition had increased very rapidly and had assumed a serious aspect.

On inspection, I found the pharynx quite normal, but the laryngeal mirror brought to view an enormously swollen epiglottis, dusky red in color. There was an indurated region at the base of the epiglottis more prominent than the neighboring tissues, while the edema extended to the base of the tongue and to both aryepiglottic folds. There was also some infiltration of the right ventricular band, so that only a small portion of the interior of the larynx and the left vocal cord was visible. The latter was not affected. Immediate operation was advised, and on making a deep incision into the indurated area, we were much pleased to see about a half dram of foul smelling pus come out. The epiglottis was further scarified, to lessen the edema. Following this treatment, together with the continuance of the adrenalin application, ice internally and externally, the local condition improved for several hours. Then, a reaccumulation of pus caused a return of the edema at the base of the tongue and aryepiglottic folds. Dr. Barnert reopened and dilated my original incision with a blunt instrument, and gave exit to considerable retained purulent secretion. A leech was applied to each side of the neck and in two hours the patient felt greatly relieved. The temperature returned to normal, but deglutition remained quite painful until a moderate-sized slough came away. In a few days the epiglottis had resumed its normal outline. On the eighth day the patient was discharged from observation, with nothing to show for her alarming experience excepting a shallow depression at the site of the infection. Examination of the pus showed chains of streptococci and some encapsulated diplococci, probably the pneumococcus.

Case 2. Mrs. P., twenty-six years old, was brought to Lebanon Hospital in the ambulance during the night of December 15, 1912. Three days prior to admission she felt chilly and had a sudden pain in her throat. She soon afterward experienced difficulty and pain in swallowing, with some disturbance in breathing, and a constant desire to clear the throat from secretion. She also had an irritating cough. These symptoms gradually became aggravated, until she was brought to the hospital.

On her arrival, the house surgeon found the patient cyanosed and dyspneic. In a muffled voice, she complained of great distress and obstruction in her throat. Her general appearance indicated a grave condition. The throat was immediately examined, and nothing abnormal was found in the pharynx except a marked pallor of the mucous membrane of the soft palate and pharyngeal wall. The epiglottis was edematous and greatly enlarged. The edema involved the aryepiglottic folds on both sides, and only a restricted view of the interior of the larynx could be obtained, which did not seem to be involved. The temperature was 102; respirations 28; pulse 94. Examination of the chest showed tactile and vocal premitus slightly increased, with some dullness on right side. Voice and breath sounds could be heard distinctly both anteriorly and posteriorly on the same side. No other active symptoms were noted. Palliative treatment consisted of free purgation, adrenalin spray, 1-3000, with ice internally and externally. Tracheotomy instruments were kept at hand, as the woman's condition demanded that all possible precautions be observed. The symptoms subsided during the next few hours, and when I saw her the next day the face was but little cyanosed, though phonation and respiration were decidedly affected. She was fairly comfortable in an upright position. Deglutition was very difficult and painful, and only accomplished after considerable effort which brought on short paroxysms of coughing. The pharynx revealed nothing of especial moment, excepting the pallor previously mentioned. The appearance of the epiglottis suggested a small sausage. It was bluish-red and almost entirely obstructed the superior opening of the larynx. No distinct picture of the interior could be seen. The edema was very decided in both aryepiglottic folds; the arytenoids were very prominent, but showed the translucent nature of the infiltration.

Under cocaine anesthesia, the epiglottis was incised, but only after several deep incisions did I locate the pus cavity. In this instance also a considerable amount of foul-smelling pus was dis-

charged. The aryepiglottic region was also incised to further drainage. The after treatment consisted of half-hourly applications of cold 25 per cent. ichthyol-glycerine mixture. Ice was applied to the neck, and was given to the patient between treatments. Ten grains of urotropin in solution were administered every four hours for its antiseptic effect. Fluid diet was continued until the local condition permitted solid food. In twenty-four hours there was sufficient improvement to lengthen the interval between the ichthyol applications. No attempt was made to disturb the patient during sleep so long as the respiration was not too labored. This method of treatment was continued until the subsidence of the local trouble. No further complications developed, and the patient left the hospital at the end of eleven days, in good condition. The temperature never rose above 102°, and gradually dropped to normal. Examination of the purulent discharge showed a streptococcus infection. No tubercle bacilli were found, and I consider that this was an acute infectious process independent of her pulmonary condition. This patient also received two doses of streptococcic vaccine, P. D. & Co., 40 millions each.

Case 3. R. K., female, twenty-two years of age, single, admitted to Lebanon Hospital, February 9, 1913. Never had any previous serious ailments. A few days prior to admission, she felt a sudden pain in the throat, accompanied by painful and difficult swallowing, and some interference with breathing. These symptoms gradually progressed until it was necessary to enter the hospital. Physical examination was negative; temperature 101°, pulse 104, respiration 28. The pharynx was slightly congested, but the epiglottis was decidedly swollen, dusky red, with the edema extending to the left aryepiglottic fold. She could swallow only fluids with considerable effort, and also complained of a lump in her throat. She was given the usual local treatment (ichthyol and ice). When I examined her on the following day, the same state of affairs existed, but the patient stated that she felt better than when admitted, and had had a fair night. After the parts had been cocainized, a small yellowish focus about 3mm. in extent was seen at the base of the epiglottis on the left side near the root of the tongue. This was incised, and a few drops of pus observed. The epiglottis and aryepiglottic fold on the same side was also scarified. The ichthyol-glycerine and ice treatment were continued as before, with increasing intervals, as the local picture im-

proved. No further trouble appeared, and the woman left the hospital at the end of nine days in good condition. The interior of the larynx was not affected. Unfortunately, no bacteriological examination was reported Urotropin was administered in this case. This was a milder type of the disease under consideration.

Case 4. G. D., male, twenty-six years old, came to the throat department of the Lebanon Hospital Dispensary, in the afternoon of April 22nd. He complained of a fullness in his throat, painful and difficult swallowing. His symptoms had started two days before, but he thought it was a simple sore throat, and used a gargle of peroxide of hydrogen. He recalled that he had felt chilly at the beginning of the attack.

As I was on service in the hospital at the time, the young man was brought to me for prompt surgical treatment. His temperature was 100.8°. On examination, I found an enormously swollen epiglottis, with an edema of the base of the tongue reaching half way to the free surface of the epiglottis. Some purulent discharge was seen along the right side of the lingual attachment of the epiglottis. Both aryepiglottic folds were edematous. A restricted view of the larynx showed no involvement of the interior. Under cocaine anesthesia, a liberal incision was carried into the infiltrated mass at the base of the tongue and epiglottis, and a considerable quantity of pus was discharged. The incision was followed by free bleeding. The opening was dilated by means of a laryngeal applicator to insure complete drainage, and several scarifications were made into the edematous epiglottis and arytenoid region. In spite of emphatic protest and explanation of the danger of sudden suffocation, the patient assumed all responsibility, and walked to his home a few blocks from the hospital. The ichthyol-glycerine mixture was prescribed to be applied in the usual way, together with ice applications and active purgation. Fluid diet was also enjoined.

The following afternoon (4/23/13), the young man reappeared at the hospital, greeted me smilingly, stated that he felt much better, but objected to the taste of that black medicine. There was a decided improvement in the local process. The abscess cavity was still draining, and the edema had diminished considerably. A good view of the larynx could now be obtained and showed no involvement. The ichthyol-glycerine treatment was continued at greater intervals, and the patient instructed to return for further observation. His temperature at this visit was normal.

Not having seen the case again, I infer that his throat needed no further attention.

The bacteriological examination showed a staphylococcus infection.

At my initial examination, I was surprised to find so little disturbance in this patient's breathing, in the presence of so much edema and swelling. This case seems to corroborate the statement of Gougenheim "that the respiratory difficulty is due to the immobility of the crico-arytenoid articulation, and not to aspiration of the swollen aryepiglottic folds.

To emphasize the serious nature of acute infectious disease of the epiglottis and larynx, I have only to direct your attention to the four fatal cases mentioned by Theisen in his interesting paper, and to the five similar results in a series of fourteen cases which Semon (3) reports in his classic paper.

We must bear in mind that alarming symptoms appear suddenly, but may subside in a few hours under active treatment. When local measures fail to bring about the desired results, the question of tracheotomy arises. Moure states that in these cases intubation is a serious, difficult, and dangerous operation, and that tracheotomy is the method of choice. Semon remarks that we must be very careful in adding further shock in these desperate cases. Seven of his patients operated upon by tracheotomy did not recover.

Some of the complications that have appeared during the course of septic infections of the upper air passages, are: pleurisy, pericarditis, endocarditis, pneumonia, peritonitis, and meningitis.

Summary: Acute infectious epiglottis suddenly appears without warning. Its progress is rapid and its symptoms are characteristic. It is seldom seen in children.

Though the four cases herewith reported were primary manifestations, this disease may appear secondary to infective conditions of the teeth, tonsils, pharynx, or tongue.

The ichthyol-glycerine treatment has proved very beneficial following the surgical intervention.

The stock or autogenous vaccines should be considered in the treatment of these cases.

That this is not a rare condition, is proved by the fact that my three last cases were seen within a period of five months in the same institution.

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DISCUSSION.

Dr. William B. Chamberlin, of Cleveland, Ohio, had had a similar case. A man, German, 50 years old, ate a bland, non-irritating meal, and at ten o'clock that night was taken with very severe pain in the throat. He saw the patient the next morning at nine o'clock, when he found a slight edema of one arytenoid. By the next day the edema had extended to the other side. He made deep scarifications with the laryngeal knife and sent the man to the hospital for immediate tracheotomy, if necessary. The edema persisted for a week or ten days, remaining stationary for four days. There was an exudation of serum and some blood, but no pus. Because of the patient's age, the question of malignancy arose, but there was nothing to substantiate such a diagnosis. There was no evidence of tuberculosis. Urine was absolutely negative. His voice is weak at present. He can talk until two or three o'clock, and then it gives out.

Dr. Thomas J. Harris, of New York City, asked if there is any distinct difference between the cases which he reported and those of ordinary edema, similar to those to which Dr. Chamberlin referred.

Dr. Lederman, in closing the discussion, expressed the opinion that cases of marked edema of the epiglottis with inflammatory symptoms were due to some form of infection. Thiesen's cases were similar to those reported. The reason why the speaker's cases subsided so promptly was because he happened to strike the pus cavity early. He cited a case, similar to that mentioned by Dr. Chamberlin, in which there was considerable edema of the aryteno-epiglottic folds. The condition came on acutely, but subsided under treatment with ichthyol applications. The disease is characterized by a rapid invasion with marked local symptoms, followed by prompt subsidence if pus is found. He believed all such cases to be infectious, and similar to those reported by Semon.

We must not overlook nephritic disease as a causative factor in edematous disease in this region. In an edema patient seen by the speaker, obstructive respiratory symptoms were the cause of the individual seeking advice. Here the urine examination revealed five per cent. of sugar, though no other symptoms pointed to diabetes. Local and dietetic treatment acted satisfactorily.

THE REPORT OF A CASE OF PARACOUSTIC VERTIGO AND NYSTAGMUS CURED BY OPERATION ON THE LABYRINTH.

By JOHN RANDOLPH PAGE, M. D., New York, N. Y.

A number of operations for the relief of vertigo have been performed on the non-suppurative labyrinth by Milligan, Lake, Yearsley and others, and Yearsley in his report "A Case of Severe Vertigo and Tinnitus; Destruction of the Labyrinth; Cure" (published 1908)[1] states that his was the ninth operation of its kind for the relief of distressing vertigo and tinnitus. "The first," he says, "was that of Milligan, the second that of Lake, who, however, antedated Milligan in publication." Since that time Mr. Lake, as he stated in his paper on vertigo before the New York Academy of Medicine last December,[2] has performed fourteen such operations. In this country the labyrinth operation for the relief of vertigo (so far as I have been able to learn) has never been performed before, at least there are apparently no available reports of any.

Last April a report of the history and examinations of this case was made before the Section on Otology at the New York Academy of Medicine.[3] Since that time his disturbing symptoms have been entirely relieved by an operation on his labyrinth. It will suffice to say now that the individual is a strong, healthy man, forty-four years of age, who since boyhood has been affected with a deafness and stuffiness in his right ear, which, until a year or more ago he could considerably relieve by a movement of his lower jaw. He never remembers having had a discharge from either ear. Seven years ago he noticed that any exertion that caused increased heart action, such as lifting, running or even laughing heartily, made him stagger and lose his balance, and at the same time the objects seen by him seemed to move up and down with the pulsations of his heart.

After November, 1910, certain sounds caused such disturbance of his equilibrium and, as he expressed it, of the objects before his eyes that he would fall when he heard them, if he did not cling to something for support. He had to have the pitch of the

whistles on his factory lowered so that they would not affect him. Rivetting machines and other loud sounds affected him in the same way.

Examination (October 6th, 1911,) revealed a markedly retracted drum-membrane and a stenosed tube on the right side, with hearing for acoumeter and whisper, 2 inches and 18 inches respectively. The left ear showed evidence of chronic middle ear catarrh with hearing for acoumeter and whisper 6 inches and 15 feet respectively. The sound from a 256-fork placed on the vertex was definitely referred to the right or poorer ear. The low tone limit was practically normal in both ears (16-fork was indistinctly heard in the right, distinctly heard in the left ear). The upper tone limit in the right ear was reduced to 6.00 on the Edelmann-Galton whistle and for the left ear 2.00. Rinne was positive in both ears. Rotation tests with head in various positions revealed nothing unusual, and the caloric test was normal.

When the right ear was closed sounds had no effect on his eyes, or equilibrium. In the right ear, however, pipe sounds above a^3 (1702 double vibrations) produced marked disturbance until a^4 (3404 double vibrations) was reached. Sounds below and above this octave caused little or no disturbance, the most marked disturbance being caused by the middle notes of the octave. He stated that at the commencement of the sound the object he was looking at seemed to move downward and to the left and remain in that position with a wavering movement until the sound ceased; it then returned to its original position. The eyes were easily seen to rise and fall when the sound was produced and stopped, and when the most effective sounds were produced his equilibrium was disturbed. At this examination the *eyes seemed to move always in the plane of the right anterior vertical canal.*

A month after this examination he was admitted to the Manhattan Eye, Ear and Throat Hospital. A lumbar puncture was performed, and 20 cc. of normal cerebrospinal fluid was withdrawn, and at the same time, because of its marked retraction, an incision was made in the right membrana tympani. Intense headache, dizziness and nausea followed and persisted for the next 48 hours, and for two weeks the slightest exertion in the upright position caused severe headache and dizziness. A grateful feeling of clearness was temporarily afforded by the myringotomy however. After three weeks the patient left the hospital, his vertigo much improved, and sounds that before would have made him fall had no effect on him.

Three months after the lumbar puncture (the 9th Feb.) he reported that the staggering tendency had entirely gone, and he had no dizziness, but the right ear had become very sensitive to the sound of his own voice, and speaking above a low tone caused his eyes to jump. He could not whistle, call, or laugh without a jumping of the objects in front of him and a disturbance of his equilibrium. High tones no longer troubled him to the extent they formerly did, but lower pitched ones became so unbearable he had to raise the pitch of the whistles on his plant back to what they were before.

When he said E, P, T, Z, etc., or such a sentence as "Ease it off," objects in front of him moved downward and to the left, and his eyes could be seen to move upward and to the right, in the plane of the right anterior vertical canal. If he whistled certain notes a marked effect was produced, and if the sounds were prolonged his equilibrium was upset. It was also found at this examination that when the note d^3 (1152 vibrations) was sounded on a pipe the eyes moved straight upward, and he said the objects in front of him moved straight downward, giving him a sensation of marked disturbance, above this pitch the disturbance was not so marked but the objects seemed to move downward and to the right, and below this pitch they seemed to move downward and to the left.

Four months later (July 8th) the patient returned again for examination and reported that since his visit in February he had had a return of his vertigo, that is, staggering while walking, two attacks, so severe that he had to cling to a fence to keep from falling.

His chief complaint, however, was the effect of his own voice on his eyes. In speaking of this he pointed somewhat confusedly to his supra orbital region and the right side of his head. (It is well to say here that the man is an exceptionally strong character, and through force of will kept constantly at his work. A man less forceful and free from hysterical tendency would have succumbed long before).

He had to acquire a very low tone of voice in conversation otherwise the objects in front of him would vibrate up and down obliquely before him. Words like ease, peas, disease, etc., would displace everything in front of him; and if he laughed heartily or said toot-toot-toot things shifted so suddenly they caused him to lose his balance entirely. At each toot his eyes could be plainly seen to jump.

No less annoying was a pulsating sound like a drum in his right ear, and although he could not remember the time when he was not able to count his pulse by hearing it in his right ear, the present sound was a new development, and it became more marked after mental, or physical labor. His only relief when it became unbearable was to lie down for fifteen or thirty minutes; the eye symptoms then subsided entirely and the pulsation ceased except for a slight sound. In using the large and small pipes of the Bezold series it was found that d^3 (1152 vibrations) on the small pipes caused objects to move straight downward, as was the case at the examinations in February, with marked disturbance (wide movement). The patient could not stand the sound for any length of time, and if it was tooted his equilibrium was upset; a^4 (3404 vibrations) caused objects to move more laterally at about an angle of 45° to the right and downward—the eyes in the opposite direction. Above this point no disturbance was obtained. The lowest note on the large pipe e^2 (640 vibrations) gave marked disturbance downward and to the left. His response to some of the intermediate notes was at times contradictory owing, he said, to the confusion from the sounds which caused him to fail to notice whether the movement was first up and then down or vice versa.

I insert here my record of the effects produced by the different pipe notes, not that I am able to interpret anything of value from it, but simply that it may be recorded in case it may excite the interest of someone with a theory to support.

d^3 (1152 vibrations). On small pipe objects move straight downward as before (in February) with marked disturbance.

e^3 (1280 vibrations). Even more disturbance, but downward and slightly to the right.

f^3 ($1363\cdot2$ vibrations). Same with less disturbance.

g^3 (1536 vibrations). Practically no disturbance and slight movement.

a^4 ($3404\cdot8$ vibrations). Objects move more laterally at about 45° to the right, eyes move in the opposite direction; above this point of a^4 no disturbance of eyes is obtained.

g^4 (3072 vibrations). Objects move upward and slightly to the right.

f^4 ($2726\cdot4$ vibrations). Objects move upward and beginning to curve towards the left with marked disturbance.

c^4 (2048 vibrations). Objects move upward and a little to the left.

a^3 (1702.4 vibrations). Objects move upward and a little to the left.

g^3 (1536 vibrations). About the same.

e^3 (1280 vibrations). Almost gone.

d^3 (1152 vibrations). Getting worse again.

c^3 (1024 vibrations). Bad, upward and to the left.

f^3 (1363.2 vibrations). Upward and to the left.

a^2 (851.2 vibrations). Straight down.

g^2 (768 vibrations). Marked disturbance, up and down to the left.

f^2 (681.6 vibrations). Marked disturbance down to left.

e^2 (640 vibrations). Lowest pitch in pipe gives marked disturbance downward and to the left.

This examination was confusing and fatiguing for the patient and he himself remarked that he could not observe accurately because of his dizziness and disturbance. This probably accounts for the contradictory answers.

As the patient's disturbing symptoms seemed to grow worse rather than better, operation for the destruction of his labyrinth was at last resorted to. A pneumatic mastoid with normal looking cells was opened, and there was no evidence in either the mastoid nor the middle ear of necrosis of any kind.

In attacking the labyrinth the horizontal and anterior vertical canals were opened and traced forward until their ampullæ were reached. These were removed, and the canals were then followed backward and the vestibule was entered posteriorly through the solid angle. The stapes was removed, and, because of the acoustic disturbance, it was thought best while at it to open the cochlear also, so the promontory was then cut away.

An instrument devised by Dr. Kerrison which easily shaves the hardest bone enables one to avoid the use of chisels and the accidents which sometimes follow their use in this operation. Particularly those accidents referred to by Dr. Richards[4] namely: the tendency of the external canal to crack through definite lines of cleavage into the Fallopian canal and cause injury to the nerve, and the modiolus to crack at its base and open the internal auditory meatus with an escape of cerebrospinal fluid.

Judging from appearance only it might have been a normal labyrinth that was being operated on. The eustachian tube was curetted thoroughly down through its isthmus with Yankauer's instrument designed for that purpose, but there was no antiseptic treatment of the wound, as I had not then heard Mr. Lake advise

it as a wise precaution. The wound was washed with normal salt solution and packed with plain gauze, a little iodoform gauze being placed next the labyrinth itself. Ten days later a meatus and flap were cut and the incision was closed behind. Three weeks later the cavity was skin grafted. There was no exposure of the facial nerve and no paralysis.

For several days after the operation the patient lay on his sound side, hunched up with his eyes closed. Nausea and vomiting persisted for four days.

At an examination on September 9th, 1912, (five and a half weeks after the operation) he stated that after the fourth day after the operation the disturbance of objects was not as great with his left eye open as it was with both eyes open, and he appeared to have less control over the right eye than over the left; the disturbance was more marked when objects were seen with the right than with the left eye. He had diplopia with both eyes open which persisted for a week. Even at that time (September 9th, six weeks after the operation,) he had diplopia when he first opened his eyes in the morning, a disturbance he had never had before the operation. He stated that after the labyrinth operation, despite the intense nausea and vomiting, he noticed that objects moved from "high left to low right," that is, they moved from left to right downward at an angle of twenty degrees. This persisted for a week and gradually diminished until there was no movement of objects except when he first awoke in the morning. Six weeks after the operation on waking in the morning objects still seemed to move slowly in this direction, but after a few minutes he would be able to overcome the illusion.

Never after the operation was he disturbed by any sounds in his ears. In this he differs from Dr. Richards' case, to be mentioned later, of the man who suffered marked disturbance from sound after his labyrinth had been removed. An attack of vomiting, or any exertion, during the first week or two after the operation would cause a gradually increasing sound, "like the passing of a subway train," in his operated ear, it occurred first faintly, and then became louder and louder like a very heavy storm, lasting a short time and then gradually subsiding. These noises became less and less frequent, but they were occasionally noticed for three weeks after the operation. Never since the operation has sound had any effect on his equilibrium, or on the movement of objects, or on his eyes themselves; nor has increased heart action caused any disturbance whatsoever. He can whistle and toot-

toot-toot with great satisfaction and without any disturbance to him of objects, or of his equilibrium.

On the ninth day after the operation the patient was allowed to sit up in bed, because he desired to do so, and thought he could. The movement, however, caused a return of the dizziness and after a few minutes he was glad to lie down again. On the eleventh day he was allowed to stand on his feet, but he would have fallen to the floor towards the operated side had he not been supported. He persisted in getting up, however, and three days later was able to walk the length of the hall unassisted, though he was very unsteady, and had a tendency to fall towards his operated side. Turning to the left at first caused a little disturbance, but this soon disappeared. On turning to the right, however, (to the operated side) marked disturbance was produced, and even a movement of his eyes to the right at the examination, six weeks after the operation (September 9th), was accompanied by a movement of all the objects to the right. This movement of objects became less every day. The patient was then able to walk without falling, with his eyes closed. He had practiced whirling, turning and walking backwards until he had excellent control of himself, though all signs of disturbance had not entirely disappeared. There was still some nystagmus on looking to the left, practically none on looking to the right. On rotation to the left ten times, after-nystagmus was slight and lasted only twelve seconds. On rotation to the right, after-nystagmus lasted only fifteen seconds, but he complained of considerable disturbance and felt a little sea-sick, though the sea-sickness was only momentary.

An examination made November 11th, 1912, (over four months after the operation) showed the cavity well dermatized except for small granulations which persisted at the opening into the vestibule, posteriorly. From this region there seemed to be a slight leakage of clear fluid, and when it was irritated with an applicator some disturbance of equilibrium and objects was remarked by him.

The patient was greatly improved and neither exertion nor sound gave him any further trouble. He had no disturbance of equilibrium except when he turned quickly to the right. He was still, however, unable to walk with certainty with his eyes closed, or in the dark.

A letter received on the 11th of January, 1913, from Dr. A. P. Butt, his physician, stated that the ear was healed, and one from

the patient himself about the same time that he feels splendidly all the time. In answer to questions he says he is not yet able to turn to the right quickly without disturbance, and that turning his head and eyes suddenly to the right causes him to sway. He still experiences difficulty in walking at night in the dark, or with his eyes closed, though the difficulty is becoming less. There is no movement of objects after exertion, or pounding in the ear as there was before the operation. There is no disturbance of equilibrium due to sound either external or from his own voice. He still has a slight hissing tinnitus which he had before the operation, a point worth noting in regard to operation on the labyrinth for persistent tinnitus.

With the exception of Dr. Richards' case, and Mr. Lake's two cases, one of the man whose vertigo was brought on by exposure to a bright light and loud noises[2], and the other whose attack followed his listening to a band[5], in none of the many cases of vertigo reported have I been able to find sound mentioned as a causal factor, though Dench says[6], "it should be borne in mind that when any portion of the auditory apparatus, either of the middle ear, the labyrinth, or the nerve trunk, is in a pathological condition, any slight stimulus, particularly an increase in the blood pressure,—may be sufficient to bring on an attack of vertigo."

The cause is frequently found to be due to derangement of the sound transmitting apparatus, or to changes in blood pressure, but, as I said before, with the exceptions mentioned I have found no case where sound itself was the exciting cause of the vertigo.

In regard to blood pressure, I recall here that Mr. Lake, recently in his remarks after the presentation of his paper before the Academy of Medicine in New York, speaking of its influence on vertigo, seemed of the opinion that the virtue claimed by many for lumbar puncture was due solely to its effect on the blood pressure, and that a more lasting benefit could be obtained with depletives and drugs in such cases than with lumbar puncture itself. In this he does not agree with many who have for some time advocated lumbar puncture without very definite reasons for expecting permanent relief from it, and more recently with Barany[7] who claims for it marked benefit, and often permanent relief in certain cases where the vertigo and "symptomenkomplex" are due to adhesions of the pia in the region of the cerebellar-pontine angle which are broken up by the sudden withdrawal of the cerebrospinal fluid.

Blake[8] calls attention to the condition of the sound-transmitting apparatus as playing an important part in the causation of vertigo, but mentions nothing about the effect of sounds on it.

A comparison of this case with the one Dr. Richards[4] mentions in his "Treatment of Purulent Affection of the Labyrinth," etc., etc., forms an interesting paradox. In his case disturbance of equilibrium was caused by certain sounds *after* the removal of the labyrinth, and in this case the opposite was true in that the disturbance caused by certain sounds was *cured* by the removal of the labyrinth.

Dr. Richards tells me that he removed not only the labyrinth but also the whole of the petrous pyramid for suppurative labyrinthitis in his case (a young musician), and that the young man while convalescing seated himself at the piano to play, but when he struck the keys he was knocked off the stool by the sound, and for months afterwards, even after the cavity had healed, musical sounds from the piano disturbed his equilibrium. He also says that while dressing this case when he touched the stump of the nerve, or the soft tissue about it in the region of the internal auditory meatus, which he had opened, the patient never failed to remark a noise in that ear, but when the bone near that region was touched with a probe no sound was heard.

Following the mention of this case in his article he says: "It would appear that we receive through the auditory apparatus certain physical impressions which, when transmitted to higher centers, act as supporting influences to the preservation of station; that these, when not balanced by similar impressions acting upon the other ear cause, so to speak, an auditory imbalance; that the disturbance is due to the lateralization chiefly to one side of those impressions, which give rise to the subjective phenomenon of sound is questionable, inasmuch as the patient, who was totally deaf before operation, experienced then no such disturbance under similar conditions." He continues, saying: "The phenomenon is suggestive of the great variety of factors which may act through the medium of the auditory apparatus and contribute to the preservation of that condition which we speak of as the state of equilibrium—it gives us an insight into the intricacy of the function of the auditory apparatus."

The disturbing, jangling effect of musical instruments, pianos particularly, on ears recovering from acute middle-ear suppuration or some other disturbance of the conducting apparatus is a familiar one, and although the effect is not usually so great as to

cause loss of balance it not infrequently causes a sensation closely akin to it.

The association of the acoustic with the static labyrinth in the subject of this report is interesting, and it, along with the views of Richards, as expressed above, might be considered by some to support v. Cyon's theory, an expression of which I quote from Dr. Fridenburg's[9] review of v. Cyon's Theory of the Labyrinth: "v. Cyon proceeds to develop his own theory, which brings the elements of tone and sound perception into relation with the innervational control and regulation, both as to intensity, succession, and duration, of the entire muscular apparatus of the body, especially of the eye; with the rhythmic co-ordination of speech, and with the psychic control of function. This co-ordination depends on concepts of number, which can only originate in the cochlea, and is associated with concepts of direction, dependent physiologically on stimulation, continuous or intermittent, of the semi-circular canals."

Later, in his criticism of v. Cyon's theory, he says: "Biologically, (too) auditory sensations can hardly be made use of as a basis for an adequate stimulus of the semi-circular canals, as these sensations have not yet appeared in lower animals which are capable of perfect orientation."

In the case just reported it would seem that when the auditory apparatus was stimulted by sounds of a certain number of vibrations a definite movement of the eyes took place in the plane of a certain semi-circular canal in the diseased ear. So according to Flouren's law there was caused by the sound vibrations just as definite a movement of endolymph in the ampulla of that canal as there was by the pump acting directly on the canal in Ewald's experiment. But pulsations from the heart also at times caused the same disturbance, so the commotion in the ampulla can not reasonably be associated with the effect on the auditory apparatus alone. It would seem rather that the effect on the ampulla was co-incident with but separately caused by the (sound) vibrations, which transmitted through the cochlea were interpreted as sound.

With this conception one can still maintain the theory of the distinct separation functionally of the auditory from the static labyrinth, and receive the support of the biologists and that of long general acceptance as well. One can still support this theory and realize that the localization of sounds may play a part in orientation, just as localization of objects by means of the eyes

do, and the muscle and tactile senses do, but that does not mean that one has to accept the view that such a close association exists between the two, static and auditory, that sound through irritation of the cochlea influences the endolymph in the ampulla, for it is only when the contents of the ampulla are abnormally sensitive or irritable that the same quality of vibration affects them both.

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DISCUSSION.

Dr. R. Bishop Canfield, of Ann Arbor, Mich., thought it extremely interesting that there was a distinct island in the auditory range, irritation of which produced the phenomenon described. It was a matter for regret that Corti's organ could not have been tested microscopically.

Dr. Thomas J. Harris, of New York City, thought the interesting case which Dr. Page presented opens avenues for a great deal of laboratory research. The clinical side of the case demands a word of comment. Lake was among the first, if not the first, to suggest opening the labyrinth in cases of persistent, intractable vertigo. Dr. Page has shown that he did not rush into operation in this case, emphasizing the fact that the procedure, as described by him, should be resorted to only when other measures have failed. He is to be congratulated for curing the vertigo without injuring the facial nerve. Dr. Dench, in speaking of the treatment of acute suppurative labyrinthitis, has pointed out that it is not at all necessary to employ the Neumann method, other operations being available. The speaker was interested in Dr. Page's remarks concerning the use of the Kerrison instrument. He asked Dr. Page to repeat, in closing the discussion, the tests for nystagmus before the operation was performed.

Dr. William B. Chamberlin, of Cleveland, Ohio, asked Dr. Page why he attributed all the trouble to one ear and none to the other, when there was involvement of both ears, more marked in one, yet present in the other.

Dr. Hill Hastings, of Los Angeles, Cal., had never had an opportunity of seeing a case of this kind. In order to report anything which may have a bearing upon the case, he mentioned a brain showing multiple aneurysms which he saw recently. The symptoms in the case were peculiar, and evanescent. There was partial paralysis of the third, fourth and sixth cranial nerves. The case had had many diagnoses, one of which was leptomeningitis. At autopsy it was found that at the base of the brain there was a large hemorrhage. On looking at the base there could be seen two or three aneurysmal dilatations of the basilar artery and one of the right internal carotid that had ruptured. The diseased condition had lasted for years, the symptoms due to pressure on the nerves mentioned. Except for the sudden death, and autopsy, the aneurysmal condition would not have been found. Some retro-labyrinthine cases may result from aneurysm of the auditory artery. In the case cited there was a specific history. He asked if Dr. Page got a Wasserman reaction in his case.

Dr. Page, in closing the discussion, said stopping the ear had been resorted to, and this controlled the symptoms before the sound of the patient's own voice began to cause the disturbance. It was after this had developed that the labyrinth operation was considered. Rotation tests showed no difference in the labyrinths before operation, and the caloric test was normal. It was easy to decide which of the two ears was susceptible to disturbance from outside sounds by stopping first one ear and then the other, for when the right ear was closed there was no disturbance. There was no specific history in the case. No Wassermann test was made. Any increase in heart action caused slight movements of objects. Before the lumbar puncture if the patient laughed heartily the same disturbance was produced. The first time he noticed it was while hunting turkeys; after running up a hill to get a shot at them, he found that when he "drew his bead" the turkeys seemed to be jumping up and down and he had to wait until his heart action subsided before he could take aim.

SOME CONDITIONS ASSOCIATED WITH THE LOSS OF CEREBROSPINAL FLUID.

By R. BISHOP CANFIELD, M. D., Ann Arbor, Mich.

I wish to relate the following cases during observation upon which, either before or after operation, there appeared an escape of cerebrospinal fluid; and to draw some conclusions from them.

Case 1. Mrs. Lizzie A., age 52, Jackson, Michigan. Patient presented herself on account of a suppurative otitis media on the left side with dizziness. During childhood she had had scarlet fever, since which time the ear has discharged at intervals. Four years ago she had a mastoid operation in San Francisco. The ear and mastoid healed after about one year's post operative treatment. Patient remained well for some months. following which occasional suppuration had been noted. About three weeks ago swelling appeared over mastoid. Since this time she has been dizzy, staggers to the right, and has been frequently nauseated.

Examination of the left ear showed great destruction of the tympanic membrane; tympanum contained small quantity of somewhat foul smelling purulent discharge. Easily bleeding granulation tissue noted around the oval window. Mastoid scar infected, red and swollen.

Hearing test:

Conversational Voice, 0

Weber to the right.

Rinne negative.

Schwabach heard in the right ear.

C—1 0.

C—4 0.

Nystagmus of one degree to both sides.

Turning test: Turning to the right after nystagmus of 15 seconds. Turning to the left after nystagmus of 15 seconds.

Caloric test: 0.

Fistula test: 0.

Radical Mastoid operation: Mastoid showed the effect of previous operation, pus and granulation tissue in the antrum, middle ear and attic, easily bleeding granulation tissue about the oval

window. Foot plate of the stapes in position, although very loose. Labyrinth not opened. Good recovery from the anesthetic.

For eight days after the operation patient showed a spontaneous rotatory nystagmus to the right which gradually disappeared. During the after dressings the stapes could not be seen. During this time there was an oozing of clear fluid from the oval window. This reappeared as fast as it could be mopped away. At several dressings it was observed long enough to make it certain that more fluid appeared than could have been contained in the labyrinth, consequently it was concluded that this must be cerebrospinal fluid. This escape of fluid persisted for about 10 days, after which it ceased. Recovery uneventful.

Case 2. Mrs. Polly R., No. 7015, age 46. Patient was referred to the clinic of Otolaryngology on account of a right suppurative middle ear disease. She had had measles 42 years ago, since which time her ear had continued to discharge. About 17 years ago had periodic attacks of dizziness. At this time several polyps were removed, which operation relieved her of her vertigo. For many years she has had pain on the right side of the head in the parietal and mastoid region. She suffers from occasional attacks of vertigo and feels like falling to the right. Two weeks ago had a severe chill.

Examination: Conjunctivae both sides anesthetic. Pharynx slightly anesthetic. Right ear, marked destruction of the tympanic membrane. tympanum contains foul smelling pus, mastoid slightly tender to pressure.

Hearing test:

Conversational voice, 0.
Weber to the left.
Rinne negative.
Schwabach heard in the opposite ear.
C—1 0.
C—4 0.
Spontaneous nystagmus 0.

Turning test: Turning to the left after nystagmus of 12 seconds. Turning to the right after nystagmus of 12 seconds. Caloric test negative. Fistula symptom positive.

July 5, 1912.—Radical Mastoid and Hinsberg Labyrinth Operation. Superficial sclerosis. Deeper parts of the mastoid, antrum and middle ear filled with pus and cholesteatoma. No fistula through canal system noted. Stapes absent. Oval window cov-

ered by elastic membrane resembling scar. Upon opening the vestibule there was free hemorrhage; granulation tissue not seen.

July 17, 1912.—Patient complains somewhat of dizziness. Horizontal and rotatory nystagmus to the left of one degree. Two days later nystagmus has disappeared. July 28, 1912. Clear fluid escaping from the labyrinth. This fluid of sufficient quantity to preclude its formation in the labyrinth. Discharge persisted for about 10 days. August 24, 1912. Patient well.

Case 3. Mrs. Sarah V., age 43, No. 1875, Ann Arbor, Michigan. Patient presented herself in the clinic of Otolaryngology with a history of having had a discharging ear since childhood. She has occasionally had severe pain over the left mastoid and left side of head and has had occasional attacks of dizziness, during which she has not fallen, but has felt great discomfort. Examination of the left ear showed the deeper parts of the canal filled with foul smelling crusts and pus, with some thickening of the anterior inferior canal wall and great destruction of the tympanic membrane. Shrapnell's membrane, posterior to the short process, was lacking; stapes and incus plainly seen through perforation. After considerable non-operative treatment without improvement in her condition, a radical mastoid operation was advised. This was performed April 27th, 1909. A tedious but satisfactory convalescence was established and the patient made a satisfactory recovery.

October 28th, 1909.—Since the radical mastoid operation, there have been times when the ear would discharge somewhat. During the periods of discharge she felt perfectly well, but between attacks complained of some dizziness and pressure in the head. Examination of the ear at this time showed it to be completely epidermatized.

January 31st, 1910.—For several weeks the patient felt perfectly well and gained in weight; ear has remained dry. Recently she has had some dizziness and pain in the head and sense of discomfort in the left eye. There is a slight horizontal nystagmus of one degree to both right and left. From this time on the patient was treated occasionally in this and the Neural clinic.

October 14th, 1911.—Nystagmus of one degree to both right and left. Turning to the right showed after nystagmus of 22 seconds; turning to the left showed after nystagmus of 45 seconds, with marked dizziness. Irrigation of the left ear with cold water

showed slight horizontal and rotatory nystagmus when eyes were turned to the opposite side, lasting a very few seconds, without dizziness. Irrigation of the right ear with cold water showed horizontal and rotatory nystagmus to the left lasting one minute and fifty seconds with marked dizziness.

October 17th, 1911.—Turning to the right gives an after nystagmus of twenty seconds with marked vertigo. Turning to the left, no after nystagmus and very slight vertigo. Irrigation of the left ear with cold water gives a slight horizontal and rotatory nystagmus to the opposite side. Patient stone deaf. Leukocytosis 10,500

November 1st. 1911.—The following operation was performed under ether. Old mastoid wound opened up, found perfectly epidermatized. Wound cavity discovered as at previous operation. As the operation progressed, there was discovered a sac capable of holding probably one-half dram of material, with an opening into the tympanic end of the Eustachian tube. This sac was curetted away. The cerebellum was uncovered and an attempt made to open the labyrinth from behind. On account of the escape of cerebrospinal fluid from a small circular opening in the dura, which was probably a large perilymphatic duct opening atypically into the subdural space, this stage of the operation was not permitted. The labyrinth, however, was opened widely from in front. As a result of the packing necessary to control the flow of the cerebrospinal fluid, the opening in the dura was much enlarged. One stitch was then taken in the dura. The patient made a good recovery from the anesthetic.

November 3rd. 1911.—Following the operation, the patient's subjective symptoms improved remarkably, and she said that she felt better than for a long time. She developed a slight nystagmus of one degree to the opposite side which persisted for three or four days. On the second day following the operation the amount of cerebrospinal fluid lost increased markedly so that the bandages, pillow and upper part of the bed were soaked for three days. The patient developed a temperature, stiff neck, Kernig's, Babinsky, edema of the retinae and some opisthotonos. She became somewhat stuporous. However, a leukocytosis did not develp. It was apparent that the patient was rapidly growing worse and without some further operative interference would probably die shortly. On this account the following operation was done at midnight: The dura of a dog was secured and tamponed firmly against the cerebellum in such a way as to cover the exposed cerebellar tissue and completely close the opening which at this

time was about the size of the middle finger. Following this procedure the patient was put in bed with the head of the bed elevated Following this operation the cerebrospinal fluid ceased to escape, and there was a marked improvement in the patient's subjective condition, with decrease in pain and decrease in temperature.

November 7th, 1911. Despite occasional attacks of severe occipital and right sided headache and the fact that her temperature ranges from 101 degrees to 104.6 degrees, the patient's subjective condition continues to improve. Today patient had a slight nose bleed. The wound was dressed and found perfectly clean, the dural graft was in position and there was no escape of cerebrospinal fluid. A Widal test was ordered and was negative.

November 9th, 1911. For each succeeding day the highest temperature is lower than the day before, the highest for today being 102.6 degrees. Last night patient complained of pain in the epigastrium and fainted. An ice cap was placed over the heart and a turpentine stupe over the abdomen. The patient slept very little. She feels fairly well today. The wound was dressed and found perfectly clean. Although there was some discharge on the dressings, there was no evidence of the escape of cerebrospinal fluid and the dural graft was in position. The white blood count was 6,500.

Then followed an uneventful convalescence.

Case 4. Karl S., age 23, No. 8088, Kalamazoo, Michigan. Patient was referred to the clinic of Otolaryngology on account of a discharging ear. He was well until six months ago when he became rather suddenly dazed and stupid. He continued in this condition for about three weeks without much fever or other symptoms than this mental torpor. After this he made a gradual improvement and gained considerably in weight. After about two months he was able to look for work, although he did not take a position. About six weeks ago he took cold at which time the ear began to pain. Pain in the ear and discomfort in the right side and back of head continued until this time. During this time has also complained of occasional severe frontal headache. A week ago the ear began to discharge a clear fluid. Five days ago complained of severe frontal headache in the evening and on the following morning was found unconscious. He remained unconscious for twenty-four hours, and since then has been semi-conscious and has complained of great pain in head

and neck. Examination: He appears stuporous. Answers questions indifferently well and slowly. He knows his name but not where he is. His neck is stiff. Double Kernig's and Babinsky. Patellar reflex absent. Pupils dilated. Nerve head and fundi slightly fluffy. Double facial paralysis, more marked on the left side. Leukocytosis 28,000. Urine shows large quantity of albumen and many casts. Cerebrospinal fluid is purulent and contains many streptococci. Does not reduce Fehling's solution. Right ear, concha is filled with perfectly clear fluid, deeper parts of canal contain pus. A clear fluid is seen escaping from the Rivinian segment. It pulsates rapidly and is apparently cerebrospinal fluid. Tympanic membrane is dark and retracted in the anterior portion and bulging in the posterior half. Mastoid not tender. Tongue dry. Buccal cavity and tongue covered with sordes. Drainage of the basal cistern was immediately made according to the method of Haynes. When the dura was opened cerebrospinal fluid escaped freely. This fluid contained large floccules of pus. The base of the brain was irrigated with warm normal salt solution during the operation. The patient recovered from the anesthetic in good condition, although respiration was very slow and deep, 6 per minute. It was noted that immediately after the lumbar puncture, which was done before the operation, the ear ceased to discharge. Two days later the patient died. Autopsy: Showed a plastic basal meningitis with extension along the fissure of Sylvius. The apex of the right temporal bone was occupied by a very large pneumatic cell containing cerebrospinal fluid and pus. The perforation through the wall of this cell had permitted the entrance of infection to the subdural space and the escape of the cerebrospinal fluid externally into the pneumatic structure of the temporal bone, thence to the middle ear and external canal.

Case 5. William S., age 42, No. 7684, Kalamazoo, Michigan. Patient was referred to this clinic on account of a carcinoma of the temporal bone which had been present for about a year. Examination showed an extensive squamous cell carcinoma, involving the external canal, middle ear and mastoid, and which had perforated through the mastoid cortex to involve the soft parts. The labyrinth did not react to the physiological tests.

December 27, 1912.—Radical Mastoid operation was performed and a large mass of carcinoma removed, together with the auricle. Patient made a good recovery and the wound became clean.

February 5, 1913.—On account of the appearance of a spontaneous nystagmus of the third degree to the diseased side and marked disturbance of the equilibrium, it was decided to resect the temporal bone. This was accordingly done. It had been the intention to remove the affected meninges and to do a dural transplantation, but inasmuch as it was discovered during the operation that the disease was too extensive, this transplantation was not made. During the operation and for some days afterwards, there was a free discharge of cerebrospinal fluid. This, however, ceased, and the patient made a good recovery. He was discharged to the care of his family physician, to die a month or two later as a result of the recurrence of the growth.

Case 6. Elizabeth M., age 4, No. 4875, Frankenmuth, Mich. Patient was referred to the clinic of Otolaryngology from the Neural clinic with the following history: Nine months ago she fell on a toy boat, the mast of which was made of a knitting needle. The needle entered the orbit just below the eye. A piece of the needle two inches long was removed immediately, and the wound healed. It did not affect the eye ball or vision apparently. The wound healed within a few days. After that she complained of headache, vomiting, more or less constant sleeplessness, and about four weeks after an incision was made at the inner side of the eye ball, from which pus escaped. Six weeks after that, Dr. Slack of Saginaw operated upon the orbit and removed another piece of steel about two inches long, which showed blunt and broken ends. The parents believe that the needle was broken off before the accident happened, and that this part is the end of the needle, but this is not absolutely certain. The child remained well after this part was removed until about 17 days ago, when she began to complain of headache, sharp and piercing in character. She vomited and was sleepless. No dizziness, no staggering was noted. When the trouble began, 17 days ago, she complained of pain only in the left frontal region, but now the pain is on both sides. She vomits less frequently now than formerly and has slight fever. Temperature has been moderate, from 99 to 100 and 101 or more in the evening. She has not had any squint the last 17 days. There is no rigidity in the back of the neck. She is irritable to noises and light, but apparently not excessively so.

Neural Examination: Patient is able to sit up, whines constantly, has an expression as if in pain. Says that she is in pain but does not know where it is. She responds to questions but evidently

does not understand fully. Head: The pupils are equal and react to light and accommodation. There is no strabismus nor extra ocusplar palsy. No tremor or atrophy of the tongue, no facial paralysis, no fever, no rigidity or retraction of the back of the neck. There is a small scar just outside the internal canthus of the left eye in the lower eye lid, slight ptosis. No Kernig or Babinsky. Chest and abdomen negative. Urine negative. Blood: Red, 5,125,000. White 16,000. Haemo. 70%.

December 10, 1910.—Transferred to this clinic for examination and operation. Ear, nose and throat examination negative. December 10, 1910.—Operation: Usual frontal sinus incision through the left eye brow to the median line. Vertical incision upward 2 inches long in the median line, periosteum retracted, cortex negative. Frontal sinus opened and found negative. Entire frontal wall of frontal sinus removed. Dura uncovered 1 inch in diameter. Dura bulged strongly forward, marked pulsation. "U" shaped flap base upwards ½ inch in diameter, followed promptly by small brain hernia. Brain deeply incised in all directions with negative result. Dural flap sutured with catgut. Skin incision sutured for primary union. Good recovery from ether.

For a week following the operation the patient was in good condition, pain on the left side of the head slightly greater than before operation. Temperature normal. December 23, 1910.—Having been restless for the past two or three days, on this morning she suddenly lapsed into semi-consciousness, from which she could be aroused with difficulty. Both optic discs were swollen. Operation: Original incision opened, dura found bulging strongly, area of bulging was incised and a large amount of creamy pus escaped. Following the escape of pus, clear pulsating fluid escaped from the depths, no doubt cerebrospinal fluid. For ten days following the operation both pus and pulsating spinal fluid escaped at the time of dressing. The wound was dressed daily with a Whiting brain searcher. Cerebrospinal fluid could be seen escaping from the left lateral ventricle. January 16, 1911.—For 16 days the wound has been clean and no cerebrospinal fluid has escaped; that is, the ventricular fistula has closed. January 16, 1911.—Operation: Wound edges freshened and sutured. During this operation it was noted that the dura bulged forward through the opening in the skull the size of a small hazel nut. It was very elastic and thin, and there seemed to be some fluid behind it. On account of the absence of symptoms, and the fact that the brain had been searched carefully on several occasions since bulging had taken

place, the brain was not opened. January 19, 1911.—For two days following the operation, the patient remained in good condition, but on the following day had a rise of temperature, became very irritable and showed a leukocytosis of 21,000. Her disposition changed suddenly and completely, she became irritable and showed violent fits of temper. She complained of severe headache on the left side of her head. On account of these symptoms, the skin incision was reopened and the brain incised, brain searcher introduced, and a second abscess discovered at a somewhat deeper level than that occupied by the first one. Immediately following the operation, the patient's condition changed entirely, and she became happy and contented. Her convalescence was uneventful, except for an attack of nasal coryza.

This case is of considerable interest because of the fact that the abscess was a double one and could be clearly demonstrated as such. Again it is a very rare thing to have a deep brain abscess recover. It is also interesting to note the effect of the abscess on the child's disposition. When she was brought in for the second operation, she was the picture of a very naughty child with a violent temper, she cried and struck at her nurse, but after the abscess was drained and immediately upon coming out from her anesthetic, she showed a very sweet and lovable disposition. Since this operation she has been perfectly content, happy and obedient. At the present time she has a slight divergent strabismus and a slight irregularity in her gait.

The method of conducting the after treatment of this brain abscess may be worthy of mention. The abscess was neither packed or irrigated, but was investigated daily by means of the Whiting brain searcher, an instrument which permits one to examine thoroughly every part of the abscess cavity, wipe it out gently and in this way by means of reflected light to control satisfactorily the healing process.

Case 7. Glenn S., age 18, No. 4215, Paw Paw, Michigan. Patient was referred to the clinic of Otolaryngology on account of discharging wound in forehead, and his mental condition. Patient well and strong until the present illness. Two months ago had a head cold with free discharge of matter from the nose. During this time complained of great headache and sleepiness. Patient would answer questions but would drop off to sleep during conversation. Slept most of the time. This condition of drowsiness lasted for two or three days. Patient not in bed but apparently weak. Felt better and walked four miles. Then

took an eighteen-mile drive to visit his brother. During his visit complained of headache, chiefly in the left frontal region. At times would appear normal and then again stupid. Nose ceased to discharge. Remained home for about three weeks, gradually getting weaker and complaining continually about the pain in his head. His father noticed that he was somewhat confused in his speech. He frequently said that he was feeling "bigger," no doubt meaning that he felt better. He began to complain that he was seeing double, and the father noted that the left eye turned in toward the nose. He was taken to a hospital where an operation was performed. After the operation he made some improvement, his eyes became straight and his mental condition improved. Three weeks before his admission into this hospital, he was again anesthetized and an intranasal operation was performed for the purpose of securing drainage from the left frontal sinus. He continued to improve and was finally sent to his home physician for observation. During his residence in his home hospital he was not dressed by his physician, but was cared for by the nurse, from which it may be thought that his condition was not considered serious. After returning to his home the wound in his forehead did not heal, but continued to discharge foul pus. His mental condition did not arouse comment. On the night previous to his coming under my observation, he began to show mental derangement; for example, when his father attempted to give him an enema, the patient placed the tube in his own ear. Later in the evening he became stupid, his answers became delayed and he again spoke of feeling "bigger" instead of better.

When he was brought to the University Hospital, he was somewhat emaciated, but was strong enough to assume the active position in bed and to turn towards the examiner without assistance. He showed no paralysis. The knee jerk was slightly increased on the right side and there was slight evidence of a Babinsky's sign on that side. He also showed a double optic papillitis, more marked on the left side. His breath was foul and the same foul odor was noted in the perspiration. He knew his name, his home and where he was, but in other matters his memory was defective. He answered questions intelligently but slowly and always in complete sentences. If asked if he had pain, he replied, "I have no pain, etc.' As soon as he had answered he would close his eyes and sink into a sort of stupor.

A sinus was present in the center of the left eyebrow through which foul pus escaped. A probe, passed gently into this sinus,

discovered no bone. On account of the location of the suppurative process and the patient's mental condition, a diagnosis of probable left frontal lobe abscess was made and an immediate operation advised.

May 25th, 1910—Operation: A "U" shaped flap was turned up from the left forehead. The anterior wall of the left frontal sinus was absent and the frontal sinus was found filled with foul pus and a mass of prolapsed brain tissue. An opening through the posterior wall of the frontal sinus, about ½ inch in diameter, was discovered. Over this area the dura was gangrenous, while the bone in the neighborhood was carious. This condition rendered the formation of an osteoplastic flap impossible. The inner table was then removed until healthy dura was uncovered in all directions. To do this it was necessary to uncover an area about 1½ inches in diameter. A sinus was discovered through the dura at a point about ½ inch above the center of the eyebrow. Through this sinus pus escaped. On account of the condition of the dura, a dural flap was impossible; therefore the brain was freely incised to permit the escape of indescribably foul pus, the odor of which must be experienced in order to be appreciated. This pus continued to escape for about fifteen minutes. During this time a very small amount of anesthetic was needed and the pulse increased about twenty beats per minute. The right frontal sinus was opened and found to be filled with foul pus and necrotic tissue. The frontal sinuses were packed with iodoform gauze, the brain cavity not being packed. No sutures were taken. The patient regained consciousness on the table and was returned to bed feeling better than before the operation.

At the second dressing about 1½ ounces of cerebrospinal fluid escaped from the depths of the wound and from then on daily for a week cerebrospinal fluid was seen to escape, at the end of which time the ventricular fistula healed.

He died three weeks after his operation without symptoms of meningitis.

Case 8. Mr. B., age 35. No. 7354, Detroit, Michigan. Patient was referred to the clinic of Otolaryngology from the surgical clinic, where he was being treated for discharging sinus near the median line in the left frontal region. Present trouble began nine months ago, at which time he struck his head on the fitting of a steam pipe. Later had pain and spontaneous rupture of the skin, with free discharge of pus. At this time the skin was freely incised at about the mid point of the left frontal sinus, and since

that time he has had more or less persistent purulent discharge. Patient states that nine years previous to this he had an accident while in a lumber camp which resulted in unconsciousness for 47 days, and necessitated trephining. Present examination showed the left eye missing (due to the accident nine years ago above mentioned). Deep crater-like scar over the mid point of the left frontal sinus, at which point patient had been trephined, and median to this is a small granulating sinus from which escapes thick pus. The throat is negative except for chronic pharyngitis. Nose shows small sharp spur low down on the right side, high deviation, and small dislocation of the cartilage on the left side. No pus noted in nose. Transillumination showed right frontal sinus to transmit light freely, less light is transmitted on the left side. Ethmoid regions on both sides transmit light freely. Transillumination of the antra normal, light reflexes being obtained on both sides. Radiograph shows shadow inside the cranium at the level of the frontal sinus. Physical examination was negative.

October 10, 1912.—Operation: Incision through the left eyebrow with vertical incision upward to neighborhood of hair line. Removal of the anterior table showed frontal sinus filled with pus and granulation tissue. Brain uncovered for a considerable area corresponding to part of posterior wall of frontal sinus. Depressed fracture the size of thumb nail. Trephine opening over the frontal lobe lateral to and above frontal sinus, showing considerable new bone formation. Curetage of frontal sinus, removal of the entire anterior wall together with roof of orbit discloses necrotic bone below area of uncovered dura, removal of which uncovered large area of the left frontal lobe and part of the right frontal lobe. Old rupture of dura noted over half moon shaped area ¼ inch in diameter, situated just below and in front of trephine opening. This rupture covered with very thin scar, which was torn during the operation, allowing the escape of a small quantity of cerebrospinal fluid. Wound irrigated and packed.

At the second dressing cerebrospinal fluid was seen oozing from the perforation in the dura near the outer angle of the wound. Wound otherwise clean and granulating. This escape of cerebrospinal fluid continued for four days, after which it ceased. Patient then passed through an uneventful recovery.

Case 9. Mr. Van F., age 52, No. 3285. Patient was referred to the clinic of Otolaryngology from the clinic of Neurology, where

he is being treated for right sided hemiplegia. Seven months ago patient fell 15 feet, striking on his forehead, did not lose consciousness but walked to the house. Had a violent nose bleed which lasted two hours, at which time his doctor sewed up the wound in his forehead. About two weeks later he began to have difficulty in walking. This seemed to be due to weakness in his right leg. Later right arm became weaker and he soon began to have difficulty in talking. Found that he could not remember the words he wished to use. Whenever he sits up clear fluid to the extent of two ounces escapes from the left nostril at which time he has left sided headache. On several occasions during which cerebrospinal fluid has been lost he has become unconscious.

Neural examination (Dr. Camp): Patient's station with eyes open is fairly good, swaying slightly, but with eyes closed the swaying is very marked. The gait shows ataxia in the right leg, so great that he can only walk three or four steps without support. There is a slight right sided facial palsy shown by a weakness in wrinkling the forehead on the right side, a slight aperture in the right eye when eyes are closed, and a lack of firmness in the right cheek when both are inflated. On protrusion the tongue goes slightly to the right. There is a very marked weakness in all movements of both the right arm and leg. Dynamometer test with the right hand is 40, with the left 115. No ataxia is noted when the patient makes circles with the left leg, but with the right the movements are jerky and faulty. Some ataxia is shown in the right arm when the patient is asked to touch the end of the nose with forefinger. There is a subjective numbness throughout the whole right side of the body, but no anesthesia to touch can be demonstrated. Pain conduction is apparently delayed throughout the right side, as the patient says that he feels a pin point more keenly on the left side. There is no difference felt in the surface temperature between the two sides of the body. Reflexes: The pupils are equal and react to light and accommodation equally but rather sluggishly. The extraocular movements are normal. The biceps, triceps, knee-jerks, and Achilles reflexes are all active on both sides but more so on the right. The abdominal and cremasteric reflexes are present and about equal on the two sides. Well marked ankle clonus and a Babinsky reflex are present on the right side, but not on the left. Measurements: Upper arm at corresponding points, right 24 centimeters, left 27 centimeters; forearm, right 22½ centimeters,

left 24; thigh, right 35 centimeters, left 37 centimeters; calf, right 27 centimeters, left 29 centimeters.

Hearing test shows air conduction to be better than bone on both sides. The sense of smell is lost in the left nostril and diminished in the right, where he smells but cannot recognize accurately. He recognizes salt on both sides of the tongue, but does not recognize sweet or sour on either side.

The physical examination is negative, except for a marked depression, the size of a quarter, above the left eye, which is the site of the trephine done the night of the accident. There is some tenderness to pressure here, but no pulsation. The examination of the blood and urine is negative. Three days after his admission, the eyes were examined in the Ophthalmologic clinic, and the following report received: Edematous retina. No hemorrhages nor papillitis. Convergence limited in the left eye. Upon sitting erect there was a loss of from one to one and one-half ounces of cerebrospinal fluid (Dr. Canfield). An exploratory operation was therefore decided upon.

July 31st, 1909.—Operation: In the left frontal region "U" shaped incision made and flap turned down, dissected away from adhesions about the old operative field and from the dura, which disclosed an opening in the bone 1 inch by 1¼ inches, from which perforation in dura was plainly visible, this perforation being ⅜ inch by ½ inch. Probe passed through this opening came in contact with brain, found brain collapsed so markedly that anterior surface of the frontal lobes lay 1½ inches from dura. Dura incised and plastic done closing the orifice by means of silk work gut. Flap sutured in place.

The second day the stitches were removed and collodion dressing applied. August 10th, 1909.—Patient in good condition, wound entirely healed, patient feels stronger, has strong grip in right hand, has had no more headaches, and claims to be regaining control of right leg.

About one month later patient resumed his duties as mail carrier, apparently perfectly recovered, although he was showing some signs of beginning general paresis (specific).

Case 10. Mr. John F., age 49, No. 7759, Pontiac, Mich. Patient was transferred to the clinic of Otolaryngology from the Surgical clinic, where he had been operated upon twice for alveolar sarcoma of the neck.

Examination at this time showed tumor mass, the size of a large fist, presenting in the right frontal region. This mass is fairly dense, with soft areas. It involves the right upper eye lid, displaces the right eye markedly to the right and forward and downward, extends over the median line. Some edema of both left eyelids, also marked edema of the right lower eyelid. Shows a scar in the right upper eye lid, also a sinus in the right frontal region from which pus escapes. Mass extends upwards ⅔ of way to hair line, not attached to the skin, except at the two points mentioned. Nose shows the right nostril completely occluded by tumor mass, which is not attached either to the septum or the lateral wall of the nose anteriorly. Free purulent discharge from the nose. Neck shows several scars on the right side. Dense mass, the size of a large English walnut, not attached to the skin, lies under the anterior margin of the right sternomastoid. Left side of neck shows scars. January 16, 1913.—Operation. Enucleation of mass lying attached to the sternomastoid and of one lobe of the submaxillary salivary gland which was lying in relationship with tumor.

January 18th, 1913—Operation: Ether. Horizontal incision beginning at the outer angle of the left eyebrow and extending across the mid-point of the right eyebrow and vertical incision in median line. Retraction of the soft tissues permitted the removal of a large mass of malignant growth. After this had been removed, it was discovered that the outer table was lacking over the entire right half of the frontal bone and part of the left frontal bone. Tumor mass was scraped out of a large frontal sinus. Right frontal lobe occupied by the tumor to a considerable depth. Profuse hemorrhage and operation was stopped at this point. Wound packed and incision sutured.

January 19th, 1913—Wound dressed, escape of a considerable amount of clear cerebrospinal fluid from the deeper portion of the tumor; that is, from the right lateral ventricle.

January 30th, 1913—Daily escape of cerebrospinal fluid for four days following which the escape ceased and the wound cleared up.

February 28th, 1913—Patient discharged to the care of his home physician with evidence of tumor growth.

Case 11. Patient Alexander H., Psyco. Record No. 428. Patient presented by courtesy of Dr. A. M. Barrett of the State Psycopathic Hospital, Ann Arbor, Michigan. Patient admitted August

20th, 1906, suffering apparently from dementia. He appeared stupid and indolent, but responded accurately to questions. He is partially blind. Speech is thick, slurring, explosive and ataxic. During the past ten days patient has been noted holding his handkerchief over his nose and when this was investigated it was noted that he had a serous discharge from the nose at the rate of about one drop per second. This fluid was found to contain a small percentage of albumen, fibrin and leukocytes. Cerebrospinal fluid was suspected. Death later from natural causes.

Autopsy: Head Section: The surface vessels were enlarged. Upon removal of the brain, the base of the skull showed marked signs of increased pressure, the cribiform plate being eroded and the brain substance protruding into the nasal cavity. The cella turcica is much enlarged, round and unusually deep. The middle cerebral fossæ are much deepened and the floor in some places is eroded, due to pressure. The posterior cerebral fossa shows marked signs of pressure, being extremely irregular. On removing the cerebellum, the inferior surface is seen to be unusually full, especially on the right side. The temporal and occipital regions of the left side of the brain are hollowed out as though from pressure. The aqueduct of Sylvius is dilated and small dark granular mass protrudes slightly from it. On the section through the upper part of the pons a small tumor mass 8 mm. by 9 mm. in diameter, is seen filling the right dilated aqueduct of Sylvius and greatly compressing the brachium of the same side. The lower portion of the sectioned pons shows the tumor mass completely filling the greatly dilated aqueduct. On the horizontal section through the vermiform process of the cerebellum extending down to the fourth ventricle the tumor mass 2.5 cm. by 3.5 cm. in diameter, is seen filling the widely dilated ventricle, producing greater pressure upon the pons and medulla on one side and the cerebellar tissue on the other. The tumor is reddish grey in color, choroidal in type, in its arrangement looking like innumerable small vessels closely crowded together. Cranial nerves not well preserved, the infundibulum is greatly dilated, being 12 mm. in diameter and the transverse fibers of the chiasm are much less prominent than normal. Longitudinal section through the middle of the thalamus shows the lateral ventricles greatly dilated, especially on the right side where the brain substance is seen bulging up in the posterior horn. The white and grey substance is greatly narrowed in all regions. Consid-

erable injection of the fine vessels is seen. The ependyma of the lateral ventricles is coarsely granular and pinkish in color. The ependyma and brain tissue of the posterior horn on the right side seems to lie in folds. The pineal gland is cystic.

Sections from the tumor show it to be composed of massed loops and sections of tubes of cuboidal epithelial cells resembling proliferated choroid plexus tissue. In place there are cysts and masses of coagulated material. The tumor is evidently an epithelial tumor, springs from the choroid plexus of the fourth ventricle, and might be called an angioma or papillary epithelioma. The tumor by its location had caused an internal hydrocephalus which had produced a softening of the bones in the region of the base of the frontal lobes and this explains the discharge of cerebrospinal fluid.

Cases Nos. 1, 2 and 3, are cases of labyrinth involvement occurring during a chronic suppurative otitis media. In case No. 1 the labyrinth was not opened at the time of operation, although failure to find the stapes after operation, together with the loss of cerebrospinal fluid daily for several days, are sufficient evidence of the fact that it had been opened.

In cases Nos. 2 and 3, the labyrinth was exenterated. Here are two cases in which the suppurative cavity was brought into communication with the subdural space without setting up a meningitis.

Case No. 3 is interesting in that it demonstrated the condition of meningismus into which a patient may lapse as a result of excessive loss of cerebrospinal fluid and that a heteroplastic dural graft was successfully made for the relief of the condition.

Case No. 4 is interesting in that the patient showed evidence of meningeal involvement long before his attention was drawn to the ear condition, and also in that the avenue of infection of the meninges and the avenue of escape of the cerebrospinal fluid through the pneumatic structures of the apex of the temporal bone could be made out.

Case No. 5 is another case in which free communication between the subdural space and the suppurating cavity did not cause meningitis.

Cases Nos. 6 and 10; that is the cases of double frontal lobe abscesses, and the case of sarcoma of the brain, show how easily sudden decrease in cerebral pressure may cause rupture of the lateral ventricles into the abscess cavity without infecting the ventricle.

Cases Nos. 7 and 8 again are illustrative of the possibility of bringing the subdural space and an abscess cavity into communication freely without setting up a meningitis.

Case No. 9 is most interesting as it demonstrates that hemiplegia may result from loss of cerebrospinal fluid and that function may be restored by stopping this escape.

Case No. 11 (Psyco.), demonstrates that the subdural space or base of the brain may remain in communication for an indefinite period with the naso-pharynx without establishing a meningitis.

DISCUSSION.

Dr. John R. Page, of New York City, had not seen Dr. Canfield's method of controlling the escape of cerebrospinal fluid, and he was much interested, as he had seen three cases where the fluid had continued to escape for a week or more following injury to the cerebellar dura in the mastoid operation. In one case, in which an extensive operation had been performed previously on the mastoid but in which a secondary operation was necessary, a rent was made in the cerebellar dura and fluid continued to escape from it for eight days. In the same case when a third operation was found to be necessary, the injury again resulted when the edges of the wound were retracted after the initial incision, the parts having become adherent to the cerebellar dura anterior and internal to the sinus. Fluid continued to escape for five or six days until it was controlled by the granulations. In another case, one of Dr. Duel's, the fluid was lost for more than a week, when the patient died from meningitis. Dr. Richards had a case in which fluid was lost for eighteen days, if he remembered correctly.

Dr. Canfield, in closing the discussion, said the canine dura was applied inside. The dura disappeared and healthy granulation appeared. The patient lived. His experience had been that the cerebrospinal fluid is the most penetrating fluid of which he knows, going through the dressings much more quickly than water. Granulation tissues might have closed the opening in time, but it would have taken longer. The dog's dura was used to control the escape of the fluid. If he had known of using the fascia lata of the patient, as is now being done in Toronto, he might have done that.

THE INFLUENCE OF SOUNDS OF DIFFERENT PITCH, DURATION AND INTENSITY IN THE PRODUCTION OF AUDITORY FATIGUE.

By WALTER A. WELLS, M. D., Washington, D. C.

It seems to be a universal law in biology that when any living substance is required to be active a certain length of time the phenomenon of fatigue sets in, manifested by a depression of irritability and a lessened capacity for work; if in spite of these symptoms, and the sensation of fatigue which generally accompanies, and is intended by nature as a reminder of the evil effects and a warning to desist, the stimulation is continued, the ultimate result is exhaustion, marked by complete incapacity for further activity. In the case of voluntary function this is the ultimate stage, because there can be no further activity in an organ which refuses to respond to stimulus. A muscle, for example, that is exhausted, cannot be stimulated to further action by an effort of the will. It is different with functions which receive stimuli involuntarily from the outside world, for to these stimuli might be continued in spite of exhaustion, resulting ultimately in a third and still more advanced stage, viz.: degeneration and destruction.

In the case of the auditory function, we have both clinical and experimental proof of the degeneration of Corti's organ from excessive stimulation.

We have known for a long time not only that sudden very intense noises of the character of violent detonations might produce labyrinthine concussion, but also that certain occupations, such as that of coopers, tin-smiths and boiler-makers, which are attended with constant, loud and disagreeable noises, might produce absolute deafness due to nerve degeneration.

Recently, Wittmaack, Marx and Yoshii have made experiments to prove that continuous intense noises were capable of producing degenerative change in Corti's organ, but they have not agreed in their interpretation of these findings with regard to their bearing upon the Helmholtz theory of audition.

Because ordinary fatigue is more easily demonstrated in the muscular fibres than in any other part of the body, physiologists

have generally selected this element for their experimental studies of fatigue phenomena. And so by their painstaking researches some highly interesting facts have been evolved governing the phenomena of fatigue and exhaustion as displayed by muscle. All are agreed at the same time that the nervous system, although eluding the application of the same fine analysis, is no less subject to fatigue than other parts.

This, however, is not equally true of all parts, for while nerve fibres are so resistant to fatigue that one author, Widenskii, goes so far as to assert that they are indefatigable, it is the consensus of opinion that nerve cells fatigue with unusual readiness.

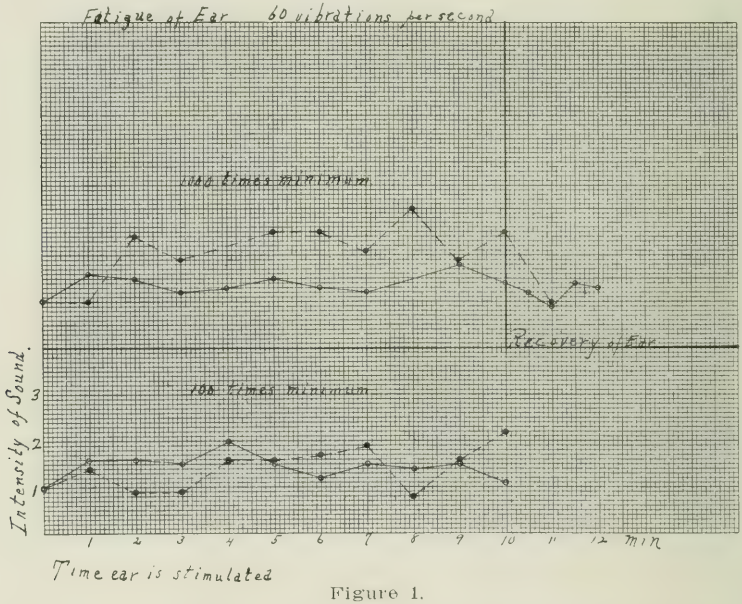


Figure 1.

The extreme delicacy of Corti's organ is such that a priori, fatigue might be expected to result with but slight provocation.

The auditory nerve and papillæ are exposed as nowhere else in the body, to a liquid which readily varies in its physiological composition and tension.

We know, most of us from our personal sensations, how by mere emotional effects we may get a surtension of the labyrinthine fluid that can make us aware of the pulsatile tinnitus from the carotid.

The frequency of tinnitus of all kinds is an evidence of the irritability of the cochlear part of the labyrinth, just as the common occurrence of vertigo from slight causes indicates the

sensative nature of the nerve fibres and cells distributed to the semi-circular canals.

As the function of audition is a very complex one, which requires for its perfect operation the concomitant activities of several kinds, it may be inferred that auditory fatigue is similarly a complex phenomenon, made up of different and diverse factors, the relative importance of which it is indeed a difficult matter to determine.

First of all our thought naturally centers upon that marvellous peripheral organ, situated in the cochlea, where according to Muller's law of specific energies of the senses, if not the most important certainly a very essential part of the work is performed. But the delicate mechanism of the middle ear must not be overlooked, for, as muscular action comes into play in its duty of transmission and delivery of the sound waves in the most effective manner, fatigue effects here must be expected. And it is especially in muscular action that its phenomena have been observed and demonstrated. That the tensor tympani contracts under the reflex stimulus of sound, was shown some time ago by Hensen and Bockendahl, and in this they have been confirmed since by other investigators. Pollak found that though sound was conveyed to one ear, a corresponding reflex contraction would also occur in the tensor tympani of the other side. It is noteworthy that his experiments seemed to show that the higher in pitch the sound stimulus, the more marked was the resulting contraction.

The hypothesis seems fairly rational that it is the special function of this little muscle to bring about different degrees of curvature and tension in the membrana tympani, in response to the impact of vibrations of varying degrees of frequency, so that this membrane might be attuned as it were to respond with a maximal sensitiveness to sounds of different *pitch*.

May we hazard the conjecture, without experimental support that the stapedius, innervated as we know, by an entirely different nerve, responds for its part only to differences in amplitude, contracting with greatest force, to sounds of greatest intensity.

From its attachments, we can infer that contraction by pulling on the oval window lessens labyrinthine pressure and by its action upon the ossicular chain, brings about relaxation of the drum membrane. These are certainly both protective functions which might have a most useful purpose in case of sounds of excessive intensity.

The contraction of the muscles of the face, especially the orbicularis, which accompanies stapedial contraction is very suggestive in this connection.

Another factor which plays a conspicuous role in audition, and which must be seriously reckoned with in the estimation of fatigue of this function, is the faculty of attention.

Consciously or unconsciously by the exercise of this faculty we sensibly facilitate the function of hearing in the higher centers, producing a state of preparedness and expectation which favors receptivity of the sensorial image. Also there is probably at the same time a drifting central-ward of energy, which though it

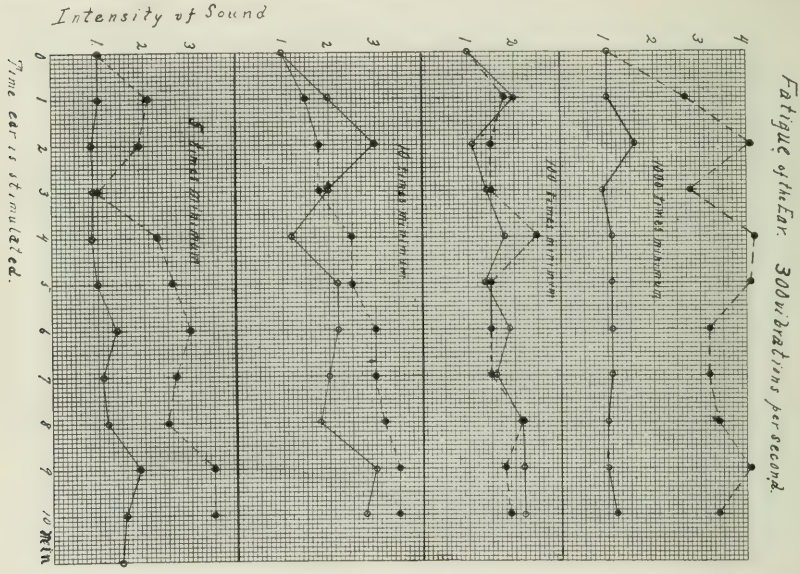


Figure 2.

may not increase the intensity of the impression, certainly tends to a better definition of the cortical image.

Attention is probably not confined in its influence to the cerebral apparatus, but exerts also a favoring influence upon the muscular mechanism of the middle ear to which we have referred. By increasing the tonus of the muscles, it may have the effect of placing the articulations and the ossicular chain in the necessary state of elasticity and suspension, which as Bonnier expresses it, render these in a higher degree susceptible to vibratory solicitations.

To return more directly to our subject, suppose we are able to uncover certain facts and formulate certain laws in regard to

auditory fatigue, how can this information be of either theoretical or practical value?

Theoretically it has seemed to us that it offers a fruitful field of study of the auditory function.

This is a very natural supposition accustomed as we are in medical science to judge what is normal by a study of abnormal manifestations, and to make deductions in regard to functions of an organ by observing its disturbances.

One of the experiments which we instituted, has as we shall see later a direct bearing upon the much contested function of the cochlea, and tends to confirm the neo-Müllerian theory which applies the law sense energy to quality as well as modality.

Practically the information derived from a study of auditory fatigue may possibly be utilized in connection with the recently launched propaganda for the suppression of unnecessary noises, as showing under what condition sounds produce injurious effects.

Furthermore such experimental studies might prove of practical value in giving a suggestion or establishing a criterion for the possible utilization of acoustic exercises in the improvement and strengthening of failing audition.

So far as our researches in the literature go, there have been but few attempts at a systematic study of the important subject of auditory fatigue.

Corradi pointed out that when a tuning fork held against the mastoid ceased to be heard, was removed and after about two seconds interval replaced, the sound perception was renewed. This might sometimes be repeated once, twice or three times.

Hammerschlag made similar observations with regard to aerial conduction of tuning fork vibration. Eitelberg observed that some individuals after listening for about forty-five seconds to the sound of a watch, would lose the sound or hear it with less intensity.

Recently Vasylieff, a Russian army surgeon, made experiments upon soldiers with reference to auditory fatigue. He compared a great number of times the duration of the vibration of forks of different pitch in case of a number of soldiers with his own, which had in each case been previously determined.

He concluded that the law of Du Bois-Reymond, as regards excitability of motor nerves may be equally true of the end-apparatus of the auditory organ.

With regard to difference in pitch he found that fatigue of the auditory nerve with sound transmission through the air, is much greater for high tones than for low.

The chief fault with experiments of this kind, is that the instruments employed do not permit of a satisfactory measurement of the sound stimulus.

Sensation itself is not actually capable of mensuration so that its power can really only be stated in terms of the energy employed to produce a given sensation.

We must, therefore, in estimating fatigue, make use of a source of sound whose intensity can be easily and exactly measured.

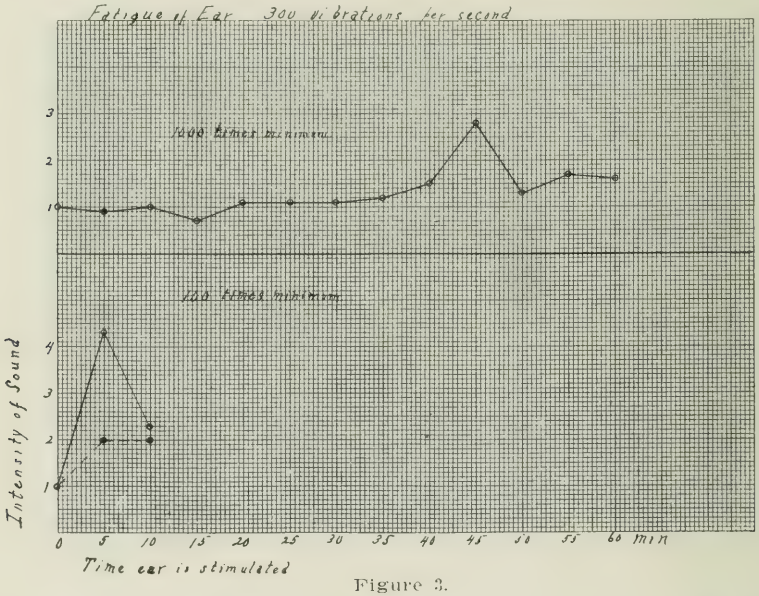


Figure 3.

The author's experiments were conducted at the Government Bureau of Standards, with the able assistance of Dr. Harvey Curtis, one of the physicists, whose expert knowledge of electricity was indispensable in such work.

We employed as the source of sound a special machine which furnished an alternating current capable of giving a frequency of from 60 to 3,000 cycles, per second. A measured current for this machine is passed through the primary of a variable mutual inductance. An alternating current having a very pure sinusoidal wave-form is thus produced and sent to a specially constructed sensitive telephone. This current may be easily varied and measured.

It is assumed that the intensity of the sound is proportional to the current, though if this intensity be defined as proportional to the square of the amplitude, the intensity is proportional to the square of the current. In this method the fatigue will appear more marked than is shown by the curves.

The method of procedure for the demonstration of auditory fatigue was as follows:

We first determined for the subject his threshold of intensity for a given pitch, that is to say, by carefully testing we determined the lowest possible intensity necessary to produce a clearly recognizable sound sensation of that particular pitch. In testing

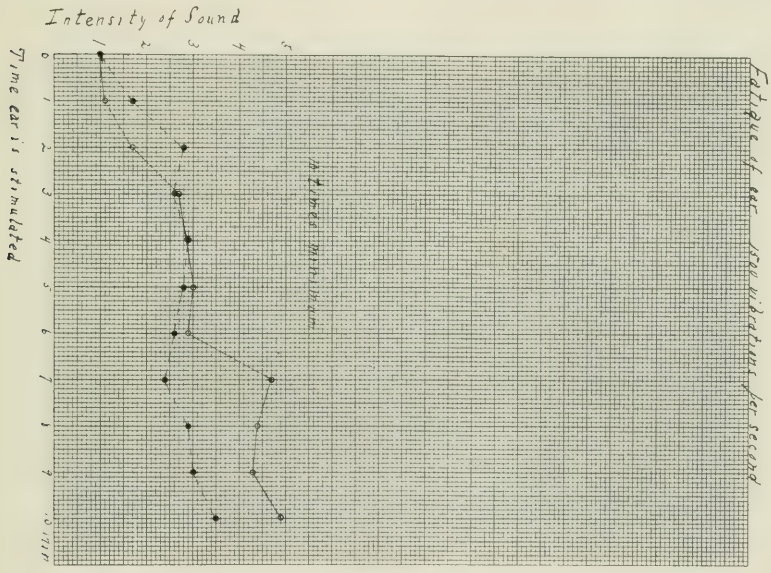


Figure 4.

this for fatigue, we would now augment the intensity of this original threshold or liminal value 10, 100 or 1,000 fold, as the case might be, and expose the subject's ear to this multiplied intensity a determined length of time.

The hearing would then immediately thereafter again be tested, to discover if the original threshold had been lowered, or raised, and how much.

This process could be repeated any number of times.

The results of the tests are graphically shown in the accompanying charts. They have not been made upon a sufficient number of subjects nor repeated a sufficient number of times to permit us to draw sweeping conclusions, but they were at least sug-

gestive enough to enable us to make a few observations which may be summarized as follows:

In practically every instance by this method we were able to demonstrate a greater or less degree of fatigue, which seemed to vary not only with pitch, duration and intensity, but with the general condition of the subject at the time of the test, and especially with state of his attention or with the disturbing noises even though they were very slight.

With regard to influences of differences in pitch, we found that towards the middle of the range the auditory organ was most resistant, and that it was especially manifest as we approached the two extremities either upward or downward.

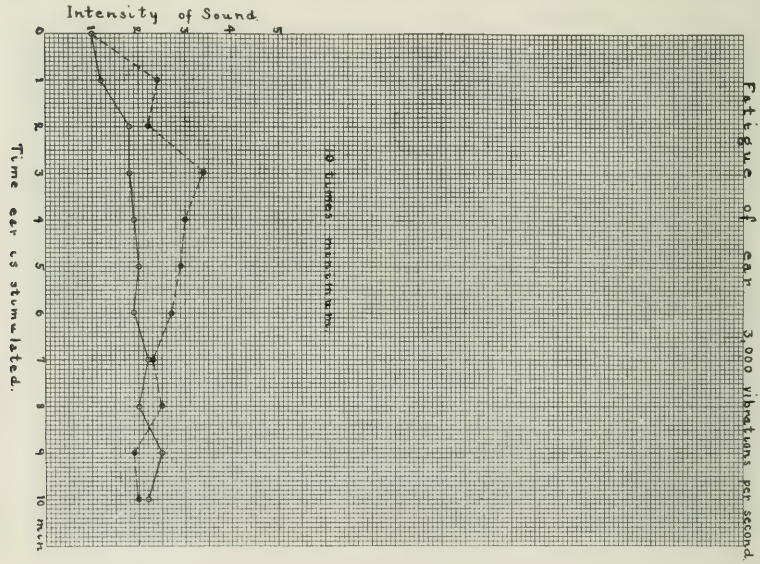


Figure 5.

This is probably due to the fact that the middle zones of the ear are the most practiced and, therefore, the most developed, for we know that though the human ear has a range of about eleven octaves the range of conversation does not extend beyond five, and is chiefly comprised within about two or three, extending upward from say 80 to 640 vibrations per second. Wien, Quix and Zwaardmaker have in fact demonstrated by painstaking tests that we have for the tonal scale a zone of maximal sensitiveness just as we have an area of greatest retinal sensitiveness. This zone has been found by these authors to extend from C^1 to G^4.

One at first thought might suppose that the more sensitive the part, the quicker it would manifest fatigue phenomena, but such is not the case, its great sensitiveness being rather an evidence of its development into an organ of greater perfection and strength. There is probably in these areas a more rapid recovery than in the less developed parts of the cochlea, in accordance with the observation made by Mateucci, that the recovery from fatigue effects occurs with greatest promptness in cells which show the most marked excitability.

As did Vasilyeff, we noticed that the higher notes were generally more fatiguing than the low. This might be explained by

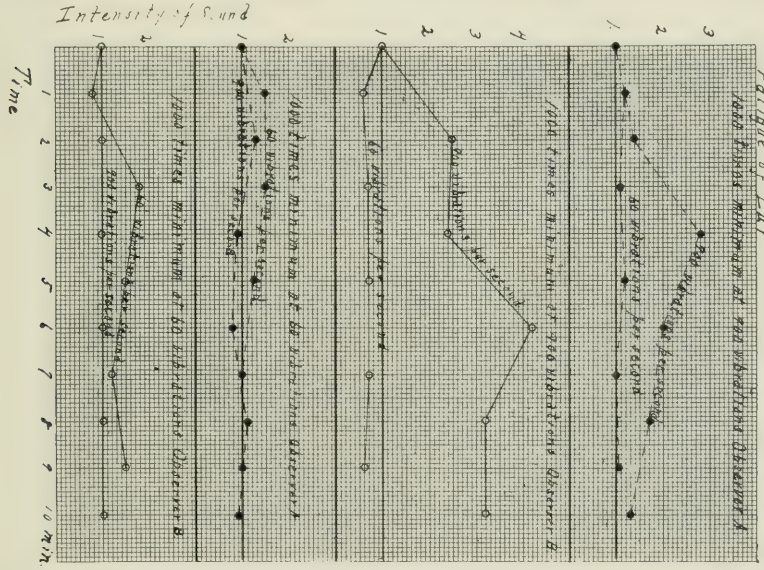


Figure 6

the fact that in the high notes greater number of vibrations must be perceived in a given period; it is quite in accord with the observation that with the same energy a greater psychical intensity is produced by high notes than by low.

Of all the experiments undertaken there was none so apparently conclusively as that done for the purpose of proving whether auditory fatigue for a certain note was restricted to that note or would be at the same equally manifest for the notes far removed in the scale.

We selected for this experiment notes of the vibratory frequency of 60 and 900 per second, respectively. The method consisted in exposing the ear first to one of the notes raised to an

intensity of one thousand times its normal liminal value for the duration of a minute, then testing for the threshold value of each, taking them alternately. We found that in either case whether we fatigued on the high and compared with the low, or on the low and compared with the high, that while the liminal value ascended considerably for the fatiguing note, it held normal value for the other.

This experiment seems to indicate that separate cochlear areas are concerned with separate notes and bears out the Helmholtz conception of the auditory function.

In order to give a physiologic basis to his theory, Helmholtz we know, carried the doctrine of specific energy as proposed by Johann Müller to a point decidedly beyond that in the mind of the propounder. Müller maintained that every sense organ if the stimulus be adequate, responds with a sensation peculiar to that organ.

The olfactory organ no matter how stimulated can give rise only to sensation of smell, the retina only one of vision, and so on.

This is a specialization of function which applies to modality only.

Helmholtz and his followers extended it also to differences in the quality of the sensation, when they maintained that for vision there must be separate nerves and cells for different colors, and in the case of audition separate nerves and cells for vibrations of sound which differ in pitch.

Thus was built up his theory of sympathetic resonance, which regards the cochlea as a vast congeries of resonators, each attuned to a different vibratory frequency corresponding in number and variety to all the notes within the range of audibility.

As regards intensity we were not able to see any direct ratio between fatigue and the grades of intensities which we used. In the higher intensities with the deep notes a booming sound seemed to linger in the ear as sort of after image, which rendered it difficult to ascertain the threshold quickly in such cases.

Sounds of low intensity approaching the threshold were particularly fatiguing because the factor of attention came here, particularly into play.

Finally our experiments, while they demonstrated conclusively the fact of fatigue in the auditory organ, at the same time served to impress us with this organ's wonderful powers of recovery.

We found that we required an average of fifteen seconds to pass from a fatiguing sound to zero and thence ascertain the lim-

inal value. Uncertainties in our mind of what we heard would sometimes cause delay, and in such case we found that even a few seconds additional decidedly affected the result. We found that where the ear showed a high fatigue value, that in testing at intervals of fifteen seconds, it gradually fell back and was generally again normal in one or two minutes.

Considering how constantly the ear is exposed to sounds not only from without but also of some of intrensic origin, it must be owing to this wonderful recuperative power that it does not show more frequently evidences of fatigue or even of a degenerative change.

DISCUSSION.

Dr. H. Holbrook Curtis, of New York City, considered this one of the most scientific contributions ever presented before the Society. Neumann's work has made a strong impress upon otology, but there is still much work to be done with reference to the functions of the labyrinth. Dr. Wells' experiments and observations concerning aural fatigue are a distinct contribution to the subject.

CONTRIBUTION TO THE ETIOLOGY OF ACUTE MASTOIDITIS.

By HENRY L. WAGNER, M. D., San Francisco, Cal.

Acute mastoiditis is in nearly every instance secondary to a previous infection and suppuration of the tympanic cavity. A few other cases may be traced to primary traumatism of the mastoid region, but primary infection of the mastoid from without is of very rare occurrence.

A case observed by Dr. A. P. Kaelber and later operated by him and myself, will illustrate this last type. A young man had been afflicted with an acute eczema of the right side of the face for about four days, at which the external ear became involved. Synchronous with this the mastoid region became swollen and edematous, and was tender on pressure. A slight fever set in. There was no discharge and, due to the swelling of the posterior wall, but little could be seen of the tympanum, which apparently was not involved in this morbid process.

Local and general treatment during a period of a few days was of little avail: pains in the mastoid region became more intensified, and a mastoid operation was immediately performed. The whole mastoid was found diseased and bacteriologic examination disclosed the presence of staphylococcus albus. The middle ear was apparently not involved.

The patient made an uneventful recovery.

Resume:

Acute mastoiditis produced by the migration of the staphylococcus albus from the skin directly into the mastoid cells, causing at first a periosteitis and thereafter an empyema with caries of the osseous structure of the mastoid bone.

DISCUSSION.

Dr. M. D. Lederman, of New York City, reported a case similar to that of Dr. Wagner, in which the cells became infected from furuncle of the external auditory canal. There was no disease of the middle ear at the onset, though later this cavity became involved. The usual surgical treatment of the mastoid cells and antrum resulted favorably.

Dr. O. A. M. McKimmie, of Washington, D. C., reported a case similar to that detailed by Dr. Wagner. The patient, a boy seven years of age, fell from a tree, striking on his head. Some days afterward there was a purulent discharge from the middle ear. Fracture of the mastoid was found, the mastoid itself being one mass of granulations and pus. Undoubtedly the infection had extended from the fracture in the mastoid and the skin outside.

Dr. Dunbar Roy, of Atlanta, Ga., recalled having reported, last year, a case in which there was thrombosis of the lateral sinus from bilateral furunculosis of the external auditory canal, this being the only case he had found in the literature. He had always looked upon furunculosis of the external auditory canal as a comparatively simple condition, but since encountering this case he had changed his views concerning the possibility of its leading to serious results. There was a septic thrombosis on each side. The mastoid presented absolutely no signs of involvement. The infection must have reached the lateral sinus by way of the petrosal veins. The trouble could not be discovered till autopsy.

Dr. William B. Chamberlin, of Cleveland, Ohio, had very recently operated upon a similar case. He had followed the case for about a week in the clinic, being unable to determine whether it was otitis externa or simple mastoiditis. The post-auricular fold was obliterated, and there was some mastoid swelling. On pushing away the posterior canal wall with the speculum, sounds were heard as well with the diseased ear as with the other. There was no pain, no discharge from the tympanum. Upon operation a subperiosteal abscess was found, as well as pus in the mastoid. The lateral sinus was exposed for three-quarters of an inch. He had not agreed with some of his colleagues in the interpretation of the X-ray plates. The radiographer was of the opinion that the mastoid was involved; he took the position that on account of the swelling, it was impossible to approximate the plate as closely to the bone as might otherwise be done. He had to acknowledge his error in this case.

CHOICE OF TREATMENT IN CHRONIC SUPPURATIVE OTITIS MEDIA.

By GEORGE L. RICHARDS, M. D., Fall River, Mass.

What is intended to be discussed is not the details of any operative or other treatment, but rather to what conclusion we should come with reference to the choice of treatment in cases of chronic purulent otitis.

First, In Children. The records of all the ear clinics where children are treated show that many of them seek treatment for chronic discharging ears. On a history being sought, none will be obtained at first, but careful, skillful questioning will bring out the fact that the ear discharge has been the result of a cold, or has followed one of the exanthemata, measles or scarlet fever. If stated to be due to frequent colds, the first thing to ascertain is the presence or absence of adenoids or enlarged tonsils, and then to correct any abnormal pharynx or naso-pharynx condition which may be evident or causative. Quite a number of cases clear up promptly with cessation of the discharge. Those which do not, and especially those due to the exanthemata usually show on examination a considerable loss of the drum membrane and adhesion of the ossicles to the inner tympanic wall. Such cases should be treated for awhile conservatively and carefully, by such thorough cleansing methods as appeal to the individual treating the case. Unfortunately, this cleansing can only be done by the physician himself or by a nurse, and almost never by the patient or friend. This necessitates frequent visits to the physician's office or clinic, and is one of the drawbacks to the conservative treatment of chronic ears. Nevertheless, a large number of these cases will clear up, the discharge stop, and the hearing improve. Nature left to herself, if she has any reasonable opportunity for drainage, will usually wall off the diseased area from the sound area, and in the case of bone, either casts off the disease or forms a sclerosed wall between the diseased tissue and the sound area. While it is no doubt true, as William McEwen wrote many years ago, "that all cases of suppurative ear trouble are potential volcanoes," the fact remains that only relatively few of the actual number of cases either come to radical operation, or die as a result of the disease.

What next is to become of these cases of suppurative ear trouble which, after long and careful cleansing treatment do not subside and do not clear up? What is to be recommended? Some type of operation and if so, what? In the choice of this, I think due consideration should be given to the question of how much hearing the child has, and many times the hearing is very good, and also to his or her ability to continue treatment. If the hearing is nearly or completely gone, the so-called radical operation is the operation of preference, as it comes nearest to complete surgical removal of the diseased material. Even here a more or less long course of after-treatment may be necessary, and it cannot be stated with absolute certainty that such an operation will always be successful in completely stopping the discharge. Many a case subjected to radical operation has occasional times when it suppurates, but as the drainage is good there is little danger from this, and if cases operated radically are seen occasionally there is little trouble.

When there is a fair degree of hearing and the major portion of the drum remains, I think some type of conservative surgical operation should be adopted, providing cholesteatomata are not present. By a conservative type I mean those advocated by Heath, Bondy, and Stacke, in which the drum membrane and ossicles are allowed to remain, and the tympanic cavity is drained from behind through the external canal. It seems to me that in America we have not yet sufficiently tried out this type of operation. I am aware that the so-called Heath operation has not fulfilled its expectations in the hands of others than its originator, but that is no reason for not continuing the search for a satisfactory conservative operation. While it is no doubt true that in some cases after a complete radical operation the hearing is not materially damaged, or may even be improved, yet reasoning from an anatomical standpoint it seems impossible that the hearing should be otherwise than usually made worse, and this I think will always be found to be the case if the affected ear is tested sufficiently carefully both before and after the operation.

How long ought a child's ear to be treated conservatively before some type of radical operation is performed? This is one of the hard questions before us. In our clinics patients with chronic ear discharge are asked day after day to return for what to the patient or parents or others seems a continual wiping out, without much result, and in the case of patients who come to our office and pay our fees, it seems to many of them a long drawn-out, ex-

pensive procedure, with, in many cases, nothing or little in the way of result. And when finally we suggest to them that after all an operation is required, they not infrequently and very naturally ask, "Well, if that is the case, why was it not done to begin with?" So that before beginning any conservative method of treatment an explanation, sufficiently simple to be understood by the patient, should be given him so as to forefend oneself.

The question will very naturally be asked, "If the ear becomes dry, will it stay dry and will I hear?" This, it seems to me, is largely a question of whether moisture, that is, water, can be kept out of the ear. After an experience of some twenty years in treating these cases, I am firmly of the conclusion that the dryer we can keep them, the better and more rapid the results. You all know how difficult it is to satisfactorily dry an ear when you have the patient before you under most favorable conditions. When syringing the ear is ordered for home use, the ear is never dry, and it is practically impossible for anyone to properly dry the ear except under good illumination. What then is the result, a moist cavity at the temperature of the body, and the micro-organisms, already present, are only favored in their development by the conditions provided.

Second, In Adults. When we turn to adults, we are confronted with two classes of chronic suppurative middle ear, one with, and one without cholesteatoma. Those without cholesteatoma may be handled somewhat the same as I suggested in children. An endeavor first of all is to be made to obtain a cure by conservative means, which with many things at our command for local use, and the careful cleansing and mild curetting which it is possible and permissible to do under good illumination, will, in most cases, be followed by good results. Here again the caution with reference to water and bathing is necessary. The question of hearing is not usually of great importance, unless both ears are involved, as if the adult has one good ear, and seeks treatment for discharge for the other, which is practically deaf, he does not usually expect the restoration of hearing in the affected ear which is apt to be poor, and from which the discharge has usually continued for months or years before relief is sought. A radical operation is then to be advised in many cases.

The question of conservative treatment in the cholesteatoma case, depends entirely on whether the opening is sufficiently large to allow the discharge of the cholesteatomatous mass. Where this is the case, and where the ear can be kept dry, even

a cholesteatoma can not infrequently be successfully treated by conservative means. Where the opening is small and the cholesteatoma is moist, nothing short of a radical operation is to be advised. In the non-cholesteatoma cases, most of them can be treated conservatively with results which are fairly good. In adults, as in the case of children, if conservatism is not followed after a reasonable time with good results, then the question of a radical operation is to be considered. It is surprising, however, what a large number of cases can be cured by careful attention to conservative methods. While I have no exact statistics, I am of the opinion that most of the cases of severe complications have occurred in patients where the suppurative otitic trouble has not been treated, but where it has been allowed to go on without much attention on the part of the individual, until through some channel or other, infection has reached either the brain, mastoid, or lateral sinuses.

I have been interested to look over the statistics reported from some of the large ear hospitals, with reference to the proportionate number of cases of purulent ear trouble which seek relief, as compared with the number of cases of operations done in these hospitals. The New York Eye and Ear Infirmary reports for the year 1911, 1283 cases of chronic suppurative otitis media, with 110 cases operated upon, a proportion of 11.7 per cent. The Manhattan Eye and Ear Infirmary reports of 1906-07-08-09-10 gives about the same results, 7350 cases, of which 706 were operated upon, or 10.4 per cent. The Massachusetts Eye and Ear Infirmary reports so far as radical operations are concerned for the years 1909-10-11, 6,507 cases of chronic suppuration treated in the outpatient department, and with 80 radical operations or 1.25 per cent. So that at least not over one in ten of those who seek relief even at our large hospitals are operated upon, and it seems to me that if thorough conservatism is applied that in one's private practice more than nine out of ten can be cured without operation. Certainly the pendulum at the present moment seems to have swung back from the time when operation was suggested for nearly every case of chronic suppurative otitis, to a somewhat middle ground, where cases manifestly demanding it are operated upon, while many others are cured, or at least the process brought to a standstill without operation. In the final analysis each case must be judged on its own merits, due consideration being given to all the factors in evidence.

USE OF NORMAL HORSE-SERUM AS A MEANS OF CONTROLLING HEMORRHAGE IN OTO-LARYNGOLOGY.

By MAX A. GOLDSTEIN, M. D., St. Louis, Mo.

The development of radical and more extensive surgery of the nose and throat in the past decade, the frequency with which the surgery of this area is undertaken even by insufficiently experienced operators, the liberal vascular distribution in the mucous membranes supplying the tissues of these fields of operation, and the peculiar, soft and elastic anatomical structures involved in this special surgery have made the question of hemorrhage and its most effective control a consideration of extreme importance.

This is especially true in the extensive surgery of the nasal septum where most liberal resections of bone and cartilage are frequently undertaken; in the complete evisceration of the ethmoid labyrinth where the ramifications of cells are frequently followed instrumentally into the sphenoid areas and close to the orbit; in the thorough and intense curetage of the pharyngeal vault and lateral walls for the removal of adenoid tissue; and finally in the formidable, complete enucleation of the faucial tonsil which has supplanted the older tonsillotomy.

In accepting this more classical form of surgery in our practical work as the practice of today we have also assumed a greater responsibility with our patients; for we have exposed wider fields to infection, necessitated greater areas of repair and reconstruction and offered more opportunities for hemorrhage.

Technically the general surgeon has a comparatively easy task in the control of hemorrhage when the bleeding vessel can be readily located and ligated; the nose and throat surgeon encounters many handicaps in the control of hemorrhage because it is difficult to locate the bleeding vessel as in the deeper curetment of the ethmoid cells or sphenoid cavity where strips of gauze are packed more or less blindly into the bleeding cavity; it is at times inaccessible, as we have all experienced, in the mechanical control of hemorrhage in the vault of the pharynx following adenectomy where the complete tamponade of the post-nasal spaces and the anterior nares is at best a somewhat clumsy procedure; in the radical tonsillectomy where the bleeding is frequently from many

smaller capillaries in the wounded faucial pillars rather than from an important vessel, and where chemical styptics, specially prepared tampons, mechanical tonsils hemostats, or even ligature of the faucial pillars must be undertaken.

Experience teaches us that many of these troublesome and nerve-racking hemorrhages may frequently be avoided by a more careful preliminary preparation of the patient. Simple adenoid curetment was formerly undertaken in our numerous clinics and even in private practice as an uneventful routine work. Patients were operated summer or winter, with or without anesthesia (local or general) and sent home shortly afterwards in dust, wind and weather. Tonsillotomy was performed as lightly as the spraying of the mucous membranes or syringing of the ear, and the patient was permitted to walk home or ride in a crowded street car without any thought of serious consequences. This was so frequently followed by earache, suppurative otitis, infections of the tonsillar regions, hemorrhage and other complications of a similar character that a reaction in the interest of the patient was found imperative.

Today a greater discretion is exercised in the conduct of these operations, and adenectomy and tonsillectomy are justly regarded as surgical hospital cases. The patient is given preliminary attention similar to other surgical cases, is kept quiet, in bed, after the operation, and the surgical field carefully inspected from time to time.

Where the surgeon obtains previous knowledge of the hemorrhagic or hemophilic diathesis in a case to be operated, constitutional measures are also undertaken to guard against any possibility of serious bleeding following operation. The time-honored therapy of administering calcium salts for a definite period preceding the operation has been given much attention. In the experience of the writer, it has, with few exceptions, proved of no practical value.

Gelatin feeding is another classic therapy which, when persistently administered for many weeks, may be of some value in the conduct of a case of definite aneurysm, but can hardly be a matter of importance for the control of hemorrhage in nose and throat surgery.

The advent of serology and the study of the chemical and biological changes in the blood has opened another avenue of research which may be destined as an invaluable agent in the preparation of patients before operation and where hemorrhage

is a possibility and where its physiological control may be more definitely exhibited.

As early as 1897, Bienwald reported the successful control of hemorrhage in a hemophilic patient following the injection of blood-serum. After a lapse of over five years Welch re-awakened the interest of the profession in this valuable therapy by the unusual results which he obtained in the treatment of hemorrhage in the new-born. The literature of the past two years contains numerous contributions on the use of the sera of a large number of animals exhibited to control hemorrhage of varying degrees in many localities. There has been such a complicity of suggestions on the use of sera and such a melange of conclusions that it is now rather difficult to evolve a simple procedure and establish fixed principles in the employment of this therapy.

It has been definitely recognized that the coagulation-principle of the blood is dependent on the action of thrombin, the so-called fibrin ferment, on fibrinogen, one of the normal elements of the blood, in the presence of calcium. This has led to the theory that delayed coagulability or absence of coagulability might be due to the lack of sufficient calcium salt in the blood, and prompted the method of feeding calcium salts to the patient in whom hemorrhage was feared or in whom hemorrhage had ensued. This theory has been abandoned, and the exhibition of calcium salts is no longer the essential factor that it was ten years ago.

The study of thrombin and anti-thrombin, bodies and antibodies, and the fibrino-plastic elements of the blood have superceded the older theories in the question of hemorrhage and its possible constitutional control.

There are many local and constitutional causes of hemorrhage, but those that concern us especially within the limitations of this paper are hemorrhages due to diminished or delayed blood-coagulation, increase of blood-pressure, and the various hemorrhagic and hemophilic diatheses; for it is assumed that the usual operations on the nose and throat are not undertaken in the presence of febrile, infectious, and pathological constitutional conditions.

With the resources of many valuable monographs, such as those of Solis-Cohen, Lescohier, White, Clowes and Busch, Rudolf, Duke, Hunter, Packard and others at hand, I have attempted to formunlate a systematic plan of observation, technic and therapy, the results of which justify my presentation of this subject in a somewhat empirical form.

My conclusions are based on a series of fifty cases which have been selected at random from private and clinic practice, irrespective of age or sex, or of the character of operation performed.

The following details were carried out in each case:

Within twenty-four hours previous to the time of operation, (1) a physical examination of the patient was made; (2) the systolic and diastolic blood-pressure test was recorded; (3) the hemoglobin per cent noted; (4) the coagulation time ascertained of blood obtained from the lobe of the ear; (5) where the time-limit of the coagulation exceeded seven minutes a hypœrdermic injection of 10 ccm. of normal, sterile horse-serum was given; (6) in each case where the serum injection was made the coagulability of the blood was again tested just prior to the time of operation.

The accompanying record-card facilitates the collection of systematic data.

Name_____ Date _____

Address_____ Age_____ Sex_____

Diagnosis_____

Anesthetic_____

Operation_____

		Date		Date		Date
BLOOD PRESSURE:						
Systolic	_____m.m	_____	_____m.m.	_____	_____min	_____
Diastolic	_____m.m	_____	_____m.m.	_____	_____min.	_____
HEMOGLOBIN	_____%	_____	_____%	_____	_____%	_____
COAGULATION TIME	_____m.m	_____	_____m.m.	_____	_____min.	_____
URINE:						
Albumin	_____	_____	_____	_____	_____	_____
Sugar	_____	_____	_____	_____	_____	_____

HISTORY:

Hemophilia
Chlorosis, pernicious anemia, leukemia, purpura, scurvy, malaria
Acute infections: typhoid, pneumonia, rheumatism, diphtheria
Exanthemata
Tuberculosis
Lues
Nephritis, arterio-sclerosis, diabetes, jaundice, gout, cancer
Menstrual irregularities
Previous serum or vaccine injections
Other diseases and further data

The physical examination of the patient included a careful inquiry into a possible hemophilic diathesis, hemato-pathology, previous exanthemata, typhoid fever or diphtheria, menstrual irregularities, and the previous employment of sera or vaccine injections.

In the determination of the systolic and diastolic blood-pressure the Tycos-sphygmomanometer was employed. The hemoglobin test was the simple method of Tallquist. Where an abnormal blood-count or hema-pathology was suspected a microscopic examination of the blood was undertaken at the same time. The method employed for measuring the coagulation-time of the blood was a modification of the simple method suggested by Duke. This apparatus was selected because of its simplicity, transportability, and fair accuracy. The description of my modification of Duke's equipment and the details of its use are here kindly furnished by Dr. T. O. Edgar, whose assistance in these observations I acknowledge with thanks:

"The time of coagulation in this test is based on the observation that a drop of blood on a glass slide will, when a certain stage in the process of coagulation is reached, maintain the same contour regard-

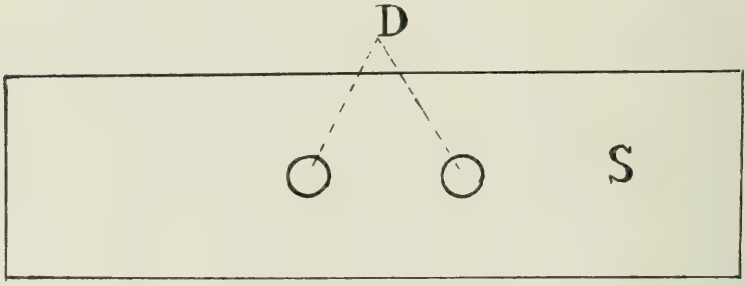


Figure 1. D. Glass disks. S. Glass slide.

less of the obliquity of the slide upon which it is resting. The apparatus used is that devised by Duke and consists of a thick glass slide (Figures 1 and 2) on which is mounted two glass disks 5 mm. in diameter and about 1 mm. in height. The blood may be obtained after the usual technic from the finger or from the lobe of the ear. The latter procedure has been used in this work. If after the site of puncture is cleansed carefully with soap and water and dried with alcohol, a thin film of vaseline is applied to the surface of the skin, the influence of contact of the blood with the skin will be lessened and the accuracy to that extent increased.

"In order to maintain as uniform a temperature as practical, the glass slide is placed in an inverted Petri dish and the latter floated in any large dish of glass or metal. An ordinary wash-basin will answer

the purpose. An ordinary chemical thermometer is placed in the bottom of the basin for temperature observations. To prevent the thermometer from rolling, an ordinary pinch-cock or any other simple device may be utilized. The temperature of the water is maintained at 38° C. or 39° C. by adding, from time to time, a little hot water from a pitcher kept within convenient reach. When all is ready, the slide and both sections of the Petri dish are placed for a few minutes in the water at 38° C. so as to impart to them the desired temperature. The slide is quickly dried, the ear punctured with a sharp lance and a drop of blood, when sufficiently large, allowed to touch the top of one of the disks. The remaining blood is immediately wiped from the ear and a second drop, obtained in the same manner, placed on the other disk. These two disks should have been numbered '1' and '2' by

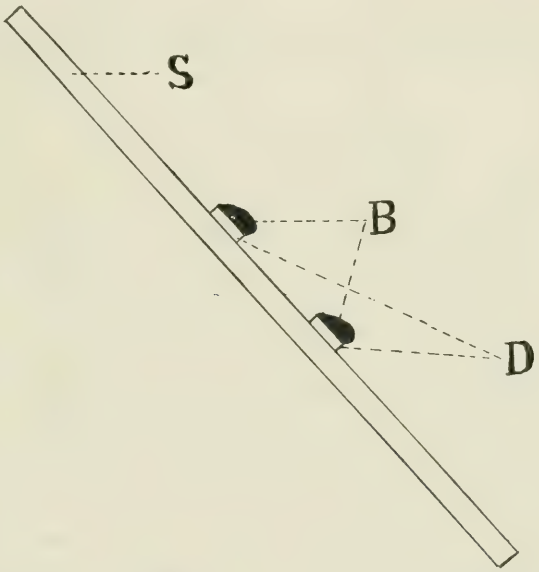


Figure 2. D. Glass disk. B. Drop of blood. S Glass slide.

marking with glass-marking pencil or otherwise. Each drop of blood when mounted should be about 2 mm. in height, and if varying much from this height, should be replaced without delay by a fresh drop. The flow of blood should be free so as to obviate the necessity of any squeezing of the ear. Having noted the time of obtaining each drop of blood, the slide is at once placed in the Petri dish and floated as in Figure 3. At the end of five minutes and each minute thereafter, the Petri dish containing the slide is taken out of the water and held slantingly to observe the effect on the contour of the drop. Before coagulation has occurred a drop of blood will, when placed in this manner, lose the perfectly convex contour it has when horizontal (Figure 3), and assume a shape as shown in Figure 2. As soon as one of

the drops maintains its contour regardless of the obliquity of the slide, the time is noted. If both drops are approximately of the same height the average elapsed time required by each drop may be taken as the time of coagulation. As an additional aid to show the approach of the desired point, one will observe, when the drop is viewed by transmitted light, that a small opaque mass of fibrin appears and the latter always seeks the lower edge of the drop when the slide is tipped to one side; but when the point of coagulation is reached this mass remains near the center and its location in the drop is not affected by tipping the slide."

In the consideration of the appended table of the records of the fifty cases tested in this manner a number of definite conclusions may be drawn:

There is a definite and consistently constant reduction of the coagulation-time of the blood observed in this first series of fifty cases, irrespective of age, constitutional dyscrasia, blood-pressure

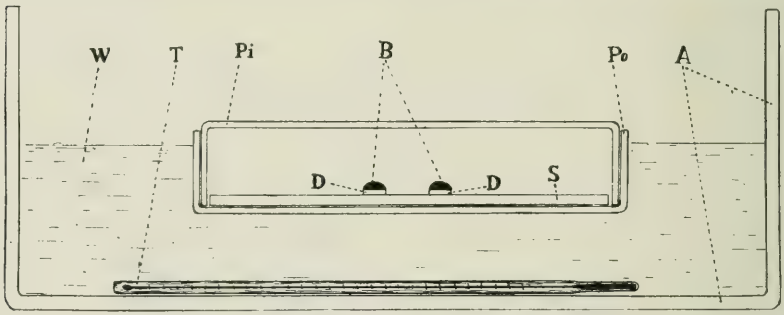


Figure 3. A. Large basin or glass dish containing water. W. Water. T. Thermometer. Po. Petri dish (outer portion). Pi. Petri dish (inner portion). S. Glass slide. D. Glass disk. B. Drop of blood.

or hemoglobin per cent, after the injection of normal horse serum. This reduction varies from one-half minute to three minutes by tests in which the blood-drop is maintained as nearly as practically possible in its usual physiological associations—namely, at uniform body temperature and free from air, dust or other extraneous influence. It must be emphasized that this quite accurately-timed coagulation period is considerably decreased when the blood is allowed to coagulate under ordinary conditions. So, for example, the remaining blood-drop on the lobe of the ear, exposed to the air, thermal and chemical changes and static influences, coagulates long before the blood-drop that is being observed in the apparatus here described.

Five of this series of cases were operated under general anesthesia; forty of this series of cases were operated under local

No.	Name	Sex	Age—Years	Blood Pressure (in millimeters) Systolic	Diastolic	Hemaglobin Per Cent	Coagulation Time (in minutes) Before Injection	After Injection	Diagnosis
1.	A.L.	M.	15	100	...	95	6½	....	Sup. O. M Chr.
2.	K.V.	F.	8	...	...	85	9	7	Hyp. Tons.
3.	R.K.	M.	20	110	...	100	6½	....	Hyp. Tons.
4.	A.B.	M.	6	100	...	95	10	7	Hyp. Tons. & Ad.
5.	G.V.	M.	30	120	...	98	11	8	Peritons. Abscess.
6.	D.S.	F.	25	110	...	100	8½	6½	Defl.Sept.
7.	D.C.	F.	35	125	...	85	11	8½	Hyp. Tons.
8.	A.B.	F.	20	125	...	80	10	8	Hyp. Tons.
9.	L.B.	F.	22	120	...	90	6½	....	Hyp. Tons.
10.	H.H.	M.	8	120	...	90	10	7½	Hyp. Tons.
11.	H.C.	M.	35	125	...	95	6½	....	Defl Sept
12.	D.H.	M.	45	125	...	95	7	6½	Chr. Ethmoiditis.
‡13.	A.S.	M.	30	120	...	70	12	11) 10) 9)	Defl. Sept.; Hemophilic.
14.	T.M.	F.	25	125	...	93	7	....	Hyp. Turb.
15.	N.P.	F.	10	125	...	95	8½	7	Hyp. Tons.
16.	N.W.	M.	12	115	...	95	8	6½	Hyp. Tons.
17.	J.D.	M.	5	100	...	95	5½	....	Adenoids.
18.	L.M.	M.	7	110	...	90	6½	....	Adenoids.
19.	S.W.	F.	8	120	...	90	7	....	Hyp. Tons. & Ad.
20.	M.L.	F.	16	125	...	95	8	6½	Hyp. Turb.
†21	S.F.	F.	10	125	...	90	9½	8½	Hyp. Tons. & Ad.
22.	C.S.	F.	32	130	...	100	7	....	Hyp. Tons.
23.	J.F.	F.	28	135	...	100	10	8½	Hyp. Tons.
24.	R.D.	M.	5	110	...	90	7	....	Ad. & Hyp Tons.
*25.	D.G.	M.	12	110	...	75	11	10) 9)	Adenoids, Hemophilic
26.	S.J.	M.	13	120	...	95	7	....	Hyp. Tons.
27.	L.S.	F.	27	125	...	90	9	7½	Hyp. Tons.
28.	H.W.	M.	24	125	...	95	8½	7	Defl. Sept.
29.	F.D.	M	52	...	...	...	7½	6½	Hyp. Tons.
30.	H.C.	M.	50	...	...	...	7½	6	Defl Sept.
31.	E.D.	M.	38	...	...	...	7½	7	Lues, 10 years ago.
32.	P.G.	F.	19	...	...	...	6	....	Hyp. Tons.
33.	V.C.	F.	24	110	...	90	7	6	Hyp. Tons.
34.	H.P	M.	7	120	...	95	7½	6½	Hyp. Tons.
35.	M.P.	F.	8	120	...	95	6½	....	Hyp. Tons. & Ad.
36.	T.S	F.	8	130	...	90	8	5½	Hyp. Tons. & Ad.
37.	D.B.	M.	3	...	...	85	7½	....	Ad. & Tons.; Lymph. Diath.
38.	M.B.	F.	4½	...	...	90	7	....	No Anesthesia.
39.	A.R.	M	3	...	...	90	7½	6½	Her. Syph.
40.	R.J.	M.	11	...	...	95	6	....	Hyp. Tons. & Ad
41.	S.F.	F.	10	125	...	90	8	7½	Ad. & Tons. (Same as 21).
42.	A.P.	F.	28	125	...	90	8½	7	
43.	P.W.	F.	4	...	...	90	8	7	Lymph. Diath.
44.	R.W.	F.	3	...	...	90	7½	7	Lymph. Diath.
45.	H.L.	F.	6	...	...	95	7	....	
*46.	A.B.	M.	5	...	...	90	7	6	
47.	H.W.	F.	4	...	...	...	6½	6	Her. Syph.
48.	R.C.	M.	45	...	...	...	9½	6½	Defl. Sept.; Diph 2 yrs. ago.
49.	S.R.	F.	11	...	...	...	8	6½	Diph., 1 year ago.
50.	N.B.	M.	15	...	...	...	8½	6	Diph., 9 months ago.

*Microscopic blood examination made in this case.

†Lymphatic diathesis; mental defective; operation deferred; see Case 41.

‡Microscopic blood examination made in this case. Since this table has been compiled six additional injections of sterile horse-serum have been administered in this case, the recurrent bleeding has ceased, and no anaphylaxis has occurred.

anesthesia; five of this series of cases were operated without any anesthesia. I operate under local anesthesia wherever possible, both in adults and children; use no adrenalin; no infiltration anesthesia, simply carefully pencilling or swabbing with 5 to 10 per cent cocain, freshly prepared for each case. The five cases operated without any anesthesia were of the lymphoid diathesis or status lymphaticus, a condition in which, in my opinion, anesthesia is absolutely contraindicated.

The greatest reduction in coagulation time (2½ to 3 minutes) was noticed in three cases, all of which had contracted diphtheria within two years prior to the time of testing, and all of which had been injected with diphtheria anti-toxin during the diphtheria attack. This may be significant of some potent change in the blood, continued for some time and still influencing the coagulation period.

In one case where lues was acquired ten years ago, and in two cases of hereditary lues, the coagulation-time was very short, by comparison, before and after using the serum (one-half minute in each case). Possibly this also demonstrates a reduced fibrinoplastic influence because of the associated lues.

In the lymphoid types, also, the short coagulation time was very marked. In four of the cases in which the serum was used, the reduced coagulation-time did not exceed one minute.

In no case has there been active bleeding of any kind after the patient left the operating-table. There has been no secondary hemorrhage. In the tonsillectomies, not even the formerly frequently observed surface oozing has been noticed; in the septal resections the dressings (I pack both nares for 24 hours) were markedly less sanguinous and I have found less occasion to repack for troublesome oozing or slow bleeding which I often formerly had when removing the first dressings.

Most of these cases are taken from private practice and I have had ample occasion to watch them carefully.

There is no doubt of the efficacy of fresh, normal, sterile horse-serum as a direct agent to reduce the coagulation-time of the blood, as is evidenced in such a large percentage of this series of cases. Packard, in commenting on the stability of serum-injection for the control of hemorrhage in a hemophilic boy on whom he had performed a bilateral tonsillectomy, records the injection of several doses of plain horse-serum without effect, and demonstrates the improvement of this patient after an injection of freshly-drawn rabbit's serum.

Such results may depend on the age of the serum, for there is, undoubtedly, deterioration in potency after a certain period. The selection of an efficient serum is as important in this therapy as is the selection of a fresh antitoxin in diphtheria.

The serum that I have used in these investigations has been kindly prepared for me by the research laboratories of the Parke Davis Company and of the H. K. Mulford Company, in 10 ccm. containers, syringe-form, equipped with sterile hypodermic needles, ready for use. Serum for this purpose should bear the date of preparation, and should not be more than three months old, for it is likely that changes in the anti-bodies may be exhibited in old serum similar to those which have been described in antitoxins.

There is another source of faulty therapy in the use of sera for the control of hemorrhage. Several observers have reported their experience with sera in individual cases of hemorrhage and have expressed doubt as to the efficacy of such sera. It must be emphasized, however, that in these cases the serum was used after the hemorrhage had ensued and not prior to the operation or time of hemorrhage. The effect of heterogenous sera as an agent to control hemorrhage is not always demonstrable within a few hours after injection but requires a longer period of time (twelve to twenty-four hours) for the modification of the fibrinoplastic elements which it influences. Such sera, therefore, must by preference be used as a preventative therapy and injected from twelve to twenty-four hours prior to the operation and not as an emergency measure or "court of last resort" when all other resources have failed.

Anaphylaxis is a complication which I have always had in mind, for in several instances of hemophilia I gave three successive injections in one case and four in another. These injections were from twelve to twenty-four hours apart and were continued until a reduction in the coagulation-time of the blood was definitely observed. All of these injections were made prior to the time of operation. No symptoms of anaphylaxis have been observed.

In two cases (one a child of 6 and the other an adult of 24) a latent rash or urticaria was noted. In the child it was a diffuse rash first appearing six days after the injection of the serum and lasting for about thirty-six hours; in the adult a roseolar rash was found about the neck and shoulder on the second day following the injection, of about twenty-four hours' duration.

While these investigations have not yet been extensively enough conducted to permit of any hard and fast lines being drawn for the employment of serum as an independently effective agent for the control of hemorrhage in all cases of surgery of the nose and throat, yet I feel justified in the claim that when used systematically as a prophylactic or preventative measure as herein set forth, and in conjunction with a simple and fairly accurate method of noting the coagulation-time of the blood, together with the determination of the blood-pressure, we have a most potent and valuable ally in the control of hemorrhage.

Clinically I can offer only my own experience in disposing of the question of hemorrhage before and since my use of sera. Formerly, whether I used the guillotine in any of its modifications, tonsil-knife and tenaculum-forceps, scissors, or the various forms of snares in a tonsil enucleation, I was never certain when or where I might be called back to the patient to combat a a troublesome hemorrhage. Today I use the serum-therapy as above outlined as a routine procedure and systematically test the coagulation-time in each case and whenever the coagulation-time exceeds seven (7) minutes, the serum is injected. When I have taken this precaution, avoided the use of adrenalin and the active mechanical disturbance of tissues by infiltration anesthesia, completed the tonsil enucleation with the Pierce-Mueller snare, dissector and volsellum forceps, I feel that my patient can be safely left without fear of hemorrhage.

DISCUSSION.

Dr. Norval H. Pierce, of Chicago, had had no experience in the injection of horse serum in the treatment of hemorrhage of the nose and throat, but from observation he believed the method to be not absolutely without danger. He cited a case in which very distressing anaphylaxis, characterized by tremendous swelling of the arytenoid bodies and other symptoms, followed the use of the horse serum. It was certainly not to be advocated as a routine procedure, but in certain cases, such as those reported by the essayist, its use was justifiable. In his own practice he had the coagulability of the blood tested beforehand, and in cases of suspected status lymphaticus he had X-ray pictures taken to determine the condition of the thymus. These precautions, together with the ligation of vessels, have saved him the experience of encountering dangerous hemorrhage. In the case of anaphylaxis there were two injections of the horse serum; a few hours after the second injection the patient began to suffer from very severe dyspnea, and examination revealed great swelling of the arytenoids and the epiglottis. The operation was for the removal of tonsils. The patient had had an immunizing dose of diphtheria anti-toxin a year before. Another danger to be borne in mind in the use of the horse serum is tetanus.

Dr. B. R. Shurley, of Detroit, Mich., had had no fatal case of hemorrhage following the tonsil operation, but he felt that it only required the circumstances to bring about, in the life history of any laryngologist, some dreadful nightmare of that sort. So great had been the mental panic of a surgeon of his acquaintance, following such experiences, that he now ligates both pillars in every tonsil operation. That however, was too radical, in the speaker's opinion. Some years ago he had attended a meeting in which calcium lactate was advocated; he took up the idea, and for some time employed it, until he found that it did not eliminate the danger of hemorrhage. In one case in which he used it he is now threatened with a suit for malpractice.

With reference to the use of horse serum in these cases, he agreed with Dr. Pierce in the belief that the method is not without danger. The possible dangers should be very carefully weighed before the method is generally employed. It should be especially borne in mind that secondary hemorrhage is particularly apt to occur during the menstrual period. He cited an interesting case of hemophilia treated with the horse serum which had come under his observation during the last year. The patient, a man, had three children. One child was subject to profuse epistaxis. The man himself had been subject to severe epistaxis since his childhood, the hemorrhage lasting for from five to ten minutes and recurring at intervals for ten days. There was absolutely no lesion in the nose which could be determined. He had a sister who was also subject to severe attacks of epistaxis. Following the removal of a tooth he had had a terrific hemorrhage, which was stopped with great difficulty. After using all the ordinary means,—adrenalin, packing, etc.,—he injected and repeated 19 cc. of horse serum. On the ninth day after this administration the patient had a very severe attack of acute articular rheumatism, as diagnosed by the internist. After seventy-two days in the hospital this man's joints were still painful. In some cases they remain stiff for more than a year after the use of horse serum. The second dose of the serum after the ninth day had been found dangerous on account of the anaphylaxis.

Dr. Joseph C. Beck, of Chicago, recalled the fact that three years ago, in Washington, he presented before one of the sections of this association the subject of the use of horse serum, with success in controlling a case of true hemophilia. Since that time he has seen two other cases in which the serum had been tried out. He emphasized the point made by Dr. Shurley, that the danger is not on the second or third day, but on the seventh, eighth, or ninth day, and that if the use of the serum be continued every day the danger of anaphylaxis will not be encountered. In anticipation of this, the blood should be analyzed. An increase of mononuclear leucocytes, with eosinophilia, is very important. In cases of asthma eosinophilia is usually present. He cited a case of hemophilia recently encountered, in which the nose was the seat of the trouble, and in which the hemorrhage was controlled by injection of serum from placental blood. The patient mentioned had stiff joints, a condition well known to characterize cases of hemophilia.

Dr. R. Bishop Canfield, of Ann Arbor, Mich., said those who employ serums and other albuminous substances should realize that the danger of anaphylaxis is very great and that it is of common occurrence. Vaughan's experiments with egg-albumin show that when this substance is given and the dose repeated in eight days the animal always dies. Small doses should be given and at frequent intervals in order to avoid the dangers of horse serum.

Dr. Henry L. Wagner, of San Francisco, Cal., stated that nearly all cases of hemophilia were male, that hemophilia must be interpreted as a disturbed production of thrombokinase in the walls of the blood

vessels, that the amount of fibrin in the walls of the blood after illness varies, as we have a state of hyperinosis (1.0 to 1.3% of fibrin) during and after pneumonia and acute rheumatism, and hypinosis (0.1 to 0.2%) during and after typhoid fever, anaemia and septicaemia. By the coagulation of blood we understand the following biological process: Fibrinogen plus Thrombasis (Fibrinferment)=Fibrin and Fibringlobulin. Thrombogen and Thrombokinasis are colloids.

Dr. Goldstein, in closing the discussion, expressed interest in the fact that the remarks of the speakers revolved chiefly about the question of anaphylaxis. It was astonishing, despite the lack of knowledge concerning anaphylaxis, to note how definite was the stand about this line of therapy. There seemed to be no uniformity of opinion as to whether a large or small dose should be given and as to the effect produced clinically by the anti-body. The selection of the horse-serum for the treatment of the conditions under consideration had been made the subject of considerable study, from the chemical and bacteriological points of view, in order to determine which was the best serum for the purpose. Human serum had not proved to be the most satisfactory serum for cause it is an albuminoid solid constituent of the blood, in contradis-coagulation. A thrombo-kinase in dry powder had been suggested betinction to thrombin, which is an albuminoid of the blood serum. Applied locally thrombokinase was washed away, however, before it had any effect. The value in the action of horse serum, given before or given after operation was emphasized. The anaphylaxis produced by the serum in diphtheria must be entirely different from that produced in an apparently normal, healthy individual. In the cases which he had observed the fever reaction was a negligible factor. Microscopic examination of the blood corroborated what Dr. Wagner had said.

PRESENTATION OF CASES.

Dr. Wolff Freudenthal, of New York City, related the history of a man, 42 years of age, who was referred to him by an oculist with the request that the accessory sinuses be examined, to ascertain whether they might reveal the cause of the patient's inability to rotate the eyes to the left side. The frontal sinuses were found to be infected. They were washed out, and immediately the man could move both eyes to the left, or normal side. This was done for two weeks. The ethmoid sinuses were cleared out to some extent, but the patient would not permit radical operation. He made the diagnosis of abscess of the frontal lobe, and advised radical operation, but this was refused and the man disappeared from observation.

Dr. Richard Hall Johnston, of Baltimore, Md., reported a case of stenosis of the trachea which had been under observation for about a year. The trouble began about three years ago, and the patient had been treated by different physicians, none of whom were willing to make a diagnosis. When first seen by the speaker, the stenosis, which was an inch and a half or two inches from the bifurcation, measured four millimeters in diameter. It was difficult to begin treatment because of an elevation of temperature, and when it was instituted, despite all treatment, the tissue returned. Microscopic examination showed chronic inflammation, with no evidence of malignancy or syphilis. Six Wassermann tests were negative; six administrations of "606" gave no benefit. Mercury and iodid of potassium had both been given to the fullest extent with negative results.

DISCUSSION.

Dr. Chevalier Jackson, of Pittsburg, Pa., said the granulation tissue which Dr. Johnston saw when he first looked into the trachea indicated the presence of perichondritis. In searching for the cause of this condition certain possibilities presented themselves. Ordinarily trauma would be the first thing thought of, but in this case the question immediately arose, how could trauma cause this condition so far down below the sternal notch? Excluding trauma, syphilis was the

next probability, but this had been excluded by repeated tests. Tuberculosis would naturally be the next consideration, but the man is in good health, and all the tests for tuberculosis had proved negative. By laboratory tests actinomycosis and glanders have been likewise excluded. The speaker, therefore, did not know what the cause of the condition is. He did know, however, that many similarly afflicted patients die from what, upon superficial examination, is diagnosticated as chronic bronchitis, bronchopneumonia, tuberculosis, etc., when a more accurate diagnosis could have been made by means of the bronchoscope. He acknowledged his inability, in the case which Dr. Johnston was handling so admirably, to offer any suggestion, other than for Dr. Johnston to continue with the endoscopic treatment which had saved the patient's life and had so greatly improved the condition.

Dr. Johnston, in closing the discussion, replied to a question by Dr. Canfield concerning the use of a soft rubber tube, by saying that he had not tried a soft rubber tube. His efforts had been directed toward keeping down the granulation tissue. He had been able to keep it under control by means of chromic acid, but when the tissue was removed it always recurred. A knuckle of tissue just above the bifurcation of the trachea always returned after removal; he was particularly anxious to get rid of this. It has the appearance of being about as broad as the index finger.

PRESENTATION OF SPECIMENS.

Dr. T. J. Harris, of New York, presented a specimen of temporal bone showing marked loss of tissue due probably to cholesteatoma. The specimen was found in the collection of skulls of the Anatomical Institute of the University of Freiburg. It is marked a "boeroe," presumably an aborigine's skull from the South Sea Islands. The rational explanation of its character is the one usually given for all these conditions; namely, an extensive cholesteatomus disease. When I first saw the specimen, I was under the impression that it was unique, but have later learned on consulting the literature, that such is not the case.

The specimen, which was the right temporal bone, represents two cavities originally separated by a complete bridge 1mm. wide, which was broken in the removal. It will be noted that the mastoid process is preserved below. Above the cavity extends to the zygoma. The anterior opening shows almost complete absence of the posterior wall of the glenoid cavity. Posteriorly, one immense cavity is seen representing the entire antrum and mastoid cells, and extending upward as far as the tegmen antri and the tegmen tympani, the latter of which contains a defect 4 mm. in the vertical diameter, by 3 mm. in the horizontal. No vestige remains of the posterior wall of the canal. The inner wall shows clearly the facial canal and the fenestrae ovale and rotunda, the promontory and the opening of the Eustachian tube. The

left temporal bone, which was not removed, showed a similar bridge 1 mm. wide. The mastoid antrum did not appear to be opened. There were two large defects in the tegmen tympani, and here also the facial canal, the fenestrum rotundum and the fenestrum ovale, were plainly to be seen, as well as the opening of the eustachian tube. Both cavities are smoothly rounded out, as if with a burr.

The exact measurements are as follows:— The right side, the posterior cavity, 1.6 cm. vertically, 1.2 cm. horizontally, 2.2 cm. deep. The anterior cavity, 1.3 cm. vertically, 1 cm. horizontally. The depth of the two cavities in the antero-posterior diameter, 3.2 cm. The left temporal bone, the posterior cavity, 1.6 cm. vertically, 1.2 cm. horizontally, 2 cm. deep. The anterior, 1.2 cm. vertically, 1.2 cm. horizontally, depth of the antero-posterior of the two cavities, 2 cm.

My thanks are due to the Director of the Anatomical Institute of the University of Freiburg for the privilege of presenting this specimen.

Dr. O. A. M McKimmie, of Washington, D. C., presented the brain of a patient who died of brain abscess of otitic origin. The patient, who was nineteen years of age, had had middle ear suppuration from childhood. She could not walk and had to be brought in in a rolling chair. Her sensorium was perfectly clear. She responded slowly but intelligently. She complained of pain in the back of the head, her temperature was 96, her pulse 50, and there was some stiffness of the neck. No Kernig present. Testing the labyrinth on the affected side gave typical responses There was paralysis of the external rectus on that side. When made to look in that direction there was slight nystagmus, but not more than on the other side. He considered this an intention tremor and no nystagmus. The diagnosis of temporosphenoidal abscess was made, and the radical mastoid operation was performed. The attic, antrum and cells were converted into one foul-smelling cavity. The cranial cavity was opened but nothing found. The patient died very suddenly about half an hour after being returned to bed. Upon autopsy a cerebellar abscess was found pressing the tentorium up against the temporosphenoidal lobe, but not touching the vermis.

PRESENTATION OF INSTRUMENTS.

Dr. Charles N. Spratt, of Minneapolis, Minn., demonstrated a needle-holder for use in the submucous resection.

This consists of a handle, with a small piece of split steel tubing, into which the large end of an ordinary sewing machine needle fits. Should the needle become dull or broken, it can be quickly replaced by a new one at a cost of less than two cents. The needles are made by heating a "oo" Singer sewing machine needle to a dull redness and giving it a slight curve just back of the eye. In fact one can obtain any curve or angle desired. The steel retains sufficient temper to prevent leveling or breaking without further treatment.

Dr. Otto J. Stein, of Chicago, presented a tonsil snare devised for the purpose of performing the Sluder technic for the removal of tonsils.

Dr. Lee M. Hurd, of New York City, presented an apparatus for packing the naso-pharynx.

MEETING OF THE EASTERN SECTION, HELD IN PHILADELPHIA, PENNSYLVANIA, FEBRUARY 22, 1913, UNDER THE CHAIRMANSHIP OF DR. GEORGE C. STOUT, OF PHILADELPHIA.

CASES OF LARYNGEAL NEOPLASM.

By Dr. Francis R. Packard, Philadelphia, Pa.

These cases showed the results of operation in two cases of tumor of the larynx, which were removed by external thyrotomy.

The first case was that of a man, now aged 72 years, upon whom two external thyrotomies had been performed for the extirpation of recurrent papilloma of the larynx. The growth first was noticed by the patient's physician in 1881, and after many attempts at removal by indirect laryngoscopy, an external thyrotomy was performed, in New York, in 1885. The growth recurred, and in February, 1905, another external thyrotomy was performed at the Pennsylvania hospital, in Philadelphia, by Dr. Le Conte. Since that time—eight years—there has been no recurrence of the growth. The case is of interest because of the long time it has been under treatment, and the fact that repeated examinations of the removed tissues showed that no change had taken place in the character of the growth from a papillomatous to a malignant type. It was typical in its etiology, as the man's occupation was that of an auctioneer.

The second case was that of a man with carcinoma of the larynx. The growth was removed by external thyrotomy by Dr. Le Conte and Dr. Packard, in February, 1911, and since that time no signs of recurrence have been evident.

DISCUSSION.

Dr. Chevalier Jackson, of Pittsburg, Pa. The first case of Dr. Packard is intensely interesting to me from two points; first because of its long duration. In the first, there was very evidently a pre-cancerous condition. There is no question that when he first developed the growth cancer was not there, but was later developed. Where it is preceded frequently by inflammatory conditions and papillomatous growth it is a long-standing question whether or not it may become malignant. It may be the site of malignancy. In a case that was seen by several members of this Society, and finally came to me, I did

a laryngectomy for endothelioma of the larynx. The patient had had a chronic laryngitis for 10 or 12 years. The other point is the excellent result that follows thyrotomy. The whole question of operating upon malignant disease is so involved, that I do not wonder so many great laryngologists say we should not operate on any. The statistics are confused. Laryngectomy is confused with thyrotomy. The latter yields the most beautiful series of results in selected cases, but it must be done only on a suitable case, and I congratulate Dr. Packard on this beautiful result.

Dr. Richardson's case is also very interesting. We used to have in one hospital in Pittsburg, six to seven hundred cases of typhoid fever in a year; and in these cases laryngeal chondritis was not uncommon. One of the earliest men to write on this subject was Dr. Emil Meyer of New York, and after reading his articles I began examining every case for this condition. One point made by Dr. Richardson is exceedingly important: namely, that though the man was not breathing well, it was not labored breathing. That is characteristic of practically all typhoid perichondritis cases that I have seen. They were not making a fight for air that was in proportion to the amount of stenosis. How many cases died before we began looking for them cannot be estimated. Many of them simply slept away. I agree with Dr. Richardson that it is a condition exceedingly serious, and one frequently not recognized at all because of the profound toxemia. The best prophylaxis is oral antisepsis with 20 per cent. to control the mixed infections which do most of the damage. The best cure is tracheotomy for its therapeutic effect, whether the patient is dyspneic or not.

Dr. H. Holbrook Curtis of New York City. I am very much interested in these cases, and the remarkable success that Dr. Packard has had. I was present at a meeting in 1886 in London, where a discussion took place between Lennox Brown and Sir Felix Semon in regard to the possibility of a benign growth becoming malignant, and although so many years have passed since then it still seems to be a possibility in the minds of some that such growths may become malignant through manipulation. I have had in my practice one or two cases that have become malignant, but, being a rather modest man I do not think that they resulted from my manipulations.

Dr. Norton L. Wilson, of Elizabeth, N. J. Dr. Packard's first case is very interesting to me and I congratulate him on the result. It recalls to my mind a case which I had a few years ago in which I split the larynx and removed a papillomatous growth, but it recurred rapidly, so that I had to perform tracheotomy. I left the tube in place two and a half years, when the man made a perfect recovery by putting his larynx out of use.

Dr. T. R. Chambers, of Jersey City, N. J. Upon nearer view of this patient it does not look as if he had been operated upon at all. It reminds me of the case of a woman operated upon for papillomatous growth in the larynx. Tracheotomy was performed and the tube has been in position nine years, the woman refusing to have anything further done. I thought the tracheotomy would cure her, but one day when the tube was taken out she came near dying, and I got there just in time to replace the tube.

Dr. Musson. Interesting from an etiological point was a case of a child brought into the hospital for acute bronchitis and dyspnea with convulsions. History of never having made a loud cry since birth. Tracheotomy with death three days after from brain lesion. Autopsy: Glottis entirely occluded by papillary growths; vocal cords quite undeveloped.

Dr. Yankauer, of New York City. I wish to endorse the remarks made by Dr. Jackson in reference to the careful selection of cases in thyrotomy, because the results in such cases are certainly superior to those obtained in any other malignant disease. In performing thyrotomy, however, the actual thing is the excision of the carcinomatous growth and suture of the mucous membrane. In the suspension laryngoscope we have a method of getting at the larynx which, so far, is superior to all other methods in this work, and it is quite possible that we may modify our views even in these cases. Dr. Meyer and I removed a carcinomatous epiglottis by this means. There was an ulceration on the epiglottis the size of a ten-cent piece, and specimen showed that it was carcinomatous. The patient was put in the suspension apparatus and the epiglottis removed. The operation was done in the following manner. After the patient was hung up in the suspension laryngoscope the epiglottis was seized in the forceps and held in the left hand. The frenum was cut with scissors and with periosteal elevator the cartilage of the epiglottis was freed from the thyroid cartilage all the way down to its attachment. With a stroke of the knife the mucous membrane was severed on one side. The epiglottis was then carried over to the other side, and the mucous membrane severed. Then the whole cartilage was removed in toto in one piece, showing the carcinomatous ulceration. The operation was done, not by punching out pieces in a more or less uncertain manner, but in a positive, definite, and surgical manner, and all the incisions were made beyond the area of carcinomatous tissue.

A CASE OF SINUS THROMBOSIS, COMPLICATING MIDDLE EAR SUPPURATION WITH UNUSUAL SYMPTOMS.

By EDWARD BRADFORD DENCH, M. D.

The following case of sinus thrombosis presented so many curious symptoms that it is deemed worthy of a separate report.

The patient was a boy, aged 14, who presented himself at my clinic at the New York Eye and Ear Infirmary, with a history of having first had a discharge from the right ear six months previously. Two months after the appearance of this discharge, he came to the clinic, and two months subsequently the discharge ceased. Three days before his admission to the hospital at the present time,—that is, six months after the first appearance of the discharge, the patient had complained of acute pain in the right ear, and a pain below the tip of the mastoid under the sterno-mastoid muscle. There had been no discharge from the right ear during the present attack. On account of the pain, the patient was unable to sleep for three nights. The boy also complained of headache and dizziness. There were no symptoms referable to the left ear.

A physical examination showed some granulation tissue in the right tympanic cavity, apparently springing from the upper and posterior quadrant. Upon the removal of this granulation tissue, it was evident that the ear had been the seat of a previous chronic suppurative process. There was a cicatricial membrane covering the tympanum, and lying at a lower level than the normal drum membrane. This cicatricial membrane was reddened and somewhat bulging posteriorly. The temperature, at the time of the first examination was 99⅘°. Owing to the patient's general condition, and the fact that he seemed seriously ill, he was admitted to the hospital. A caloric test, made prior to the patient's admission to the hospital, showed that both labyrinths reacted to the caloric test. At the time of his admission there was some spontaneous nystagmus to the right, or affected side. Immediately upon the patient's admission to the hospital the granulation tissue was removed from the right tympanic cavity. Following this slight operation, the temperature began to rise, until, on the following morning, at 8 o'clock, it reached 104°. It remained at

practically this level for eight hours. I examined the patient during this interval, and found a fairly well nourished boy, complaining of severe pain in the right side of the neck, crying out with almost a characteristic meningitic cry, with no stiffness of the neck, no rigidity in any other part of the body, no Babinski, no Kernig sign, and no general headache. There was slight nystagmus to the affected side.

A careful caloric test was made of the right ear, and the right labyrinth was absolutely dead. I might say here, in passing, that, as already stated, the caloric test, made twenty-four hours before, by one of my most competent men, showed an active labyrinth on each side. This total absence of caloric reaction of the right labyrinth, coupled with the restlessness of the patient, the sudden rise in temperature, and the characteristic cry, made me think of a meningitis following a labyrinth suppuration, probably excited by the removal of granulation tissue from the right ear. The high temperature, however (104°), the absence of rigidity, the absence of the Babinski sign,—in fact, the absence of all symptoms of meningitis, other than the restlessness and the characteristic cry, made me defer interference until there could be a further examination. A spinal puncture was at once made, and the fluid examined. The cerebro-spinal fluid was clear, was not evacuated under pressure, the differential cell count was normal, the reaction was slightly alkaline; Fehling's test was normal, that is, the fluid reduced the Fehling solution, showing that the carbohydrates were not absent; also, the globulin test was normal; that is, there were no excess of globulin. In other words, we had not to do with a case of incipient meningitis. A blood culture was made at the same time, and this blood culture, after eighteen hours, showed two colonies of streptococci. Three hours later it showed an increased number of colonies,—I think, two or three more. It was evident, therefore, that we had to deal with a general streptococcic infection. This made me change my opinion, and believe that we had to deal with a sinus thrombosis instead of an acute meningitis. A radical operation was performed, the mastoid was found diploic, and no sinus or dura were exposed at the time of operation. The horizontal semicircular canal and the promontory were examined for fistulae, with negative results. The oval and round windows were closed. The sinus was then rapidly exposed. It lay fully one-half an inch behind the limit of the radical operation, and there was no fistula extending from the cavity exposed by the radical operation, to the lateral sinus.

Nevertheless, when the sinus groove was opened, there was an escape of fetid gas. The sinus was found collapsed, and separated from the posterior surface of the petrous pyramid for fully one-half an inch. No free pus was present in this space, although the surface of the sinus was covered with an exudate of fibrin. The sinus was rapidly exposed backward toward the knee, and downward to just above the jugular bulb. It was thrombosed throughout its entire area. The jugular was then exposed in the neck, and was tied at the level of the omohyoid muscle. It contained fluid blood. The jugular was divided between two ligatures at this level, and was resected to a point just above the entrance of the facial vein, this latter vessel being divided between two ligatures during the excision. Just above the level of the facial vein, the internal jugular appeared thickened, and white in color, —in other words, it was occupied by a clot at this level. The wound in the neck was closed by means of Michel clamps, the upper and lower ends of the wound being left open, and a drain being inserted to drain the deep intermuscular space. The lateral sinus was then opened at a point midway between the knee and the bulb. The sinus wall was very much thickened, but after the lumen of the vessel had been entered, and a curette introduced downward, free hemorrhage occurred from below. Hemorrhage was stopped in this direction, and the curette passed upward, when very free hemorrhage occurred from the torcular end of the sinus. This proved that the circulation from the inferior petrosal sinus and from the torcular was free. The hemorrhage was controlled by firm packing, and the wound dressed in the ordinary manner.

The patient's temperature, immediately before operation, was 106°. It fell within the next twelve hours to 99½°. The following day it did not go above 102⅖°. At noon the next day, it was only 100⅕°. It then gradually began to rise, and at midnight on the second day after the operation, it was 102⅗°. At that time the patient began to complain of some pain in the right side, and the physical signs showed that he was suffering from either beginning pneumonia or from pleurisy with effusion. The fact that he had simple crepitation over this side, did not render the diagnosis positive at this stage. Lumbar puncture was made on the third day after operation. The spinal puncture showed a normal cerebro-spinal fluid. It was clear in appearance, the globulin test was negative, and Fehling's solution was reduced. The cellular count was negative except for a few blood cells. A small amount of albumin was present in the cerebro-spinal fluid.

It was assumed, therefore, that the patient was not suffering from meningitis, but that the rise in temperature was entirely due to the chest complication. On the following day, that is, the seventh day after the patient's admission, and the fifth day after the first operation, the patient's temperature rose at noon to 105⅘°. A lumbar puncture on this day showed a clear fluid, but a cultivation of the fluid showed long chains of streptococci on the following day. On the next day a lumbar puncture showed a turbid fluid, which reduced Fehling's solution, albumin was present, the globulins were in excess, and pus, blood and streptococci were present in the cerebro-spinal fluid obtained by lumbar puncture, thus clearly demonstrating that the patient had a meningitis. The boy was taken to the operating room, and the labyrinth was opened and freely drained, according to the Neumann method; that is, it was opened along the posterior surface of the petrous bone until the vestibule was freely opened, and then the first turn of the cochlea was ablated, and free drainage established. Owing to the fact that the superior petrosal sinus crossed the field of operation, and because this sinus was exceedingly large, and it would have been impossible to have incised the dura close to the internal auditory meatus without injuring the sinus and thus frustrating the effects of incision of the dura in this neighborhood, the dura was not opened. The lateral sinus wound was inspected, and the entire sinus groove was found to be filled with a sloughing sinus wall. The bulb was next fully exposed, in order that the bulb could be freely cleared out. No extensive hemorrhage occurred from the jugular bulb. The patient was then returned to bed. The temperature immediately fell, after this operation, to 102°, and rose about eight hours after to 103°. It then fell to 101⅘°, and the patient seemed very comfortable. The pulse was good, and the only symptom that the patient complained of was pain in the chest. Suddenly the patient complained of severe dyspnea, became cyanotic, and died within half an hour. No autopsy was permitted. The supposition is that the patient died of a sudden pulmonary embolus.

In reviewing the history of this case, the principal points seemed to be those of a sudden ablation of function of the right labyrinth, and the possible misinterpretation which might have been placed upon this sudden ablation of function, had not a full and careful examination of the case been made. From the patient's symptoms, and the fact that the labyrinth had suddenly become inactive to

the caloric test, I should have felt justified in doing an immediate operation for a meningitis. A perfectly normal cerebro-spinal fluid, however, and the presence of streptococci in the blood, proved that such a diagnosis would have been erroneous, and demonstrated fully the value of a positive blood culture in cases of this character. This patient had no symptoms of sinus thrombosis aside from a sudden rise in temperature and considerable tenderness at the angle of the jaw. All of the other symptoms were indicative of meningitis. The findings at operation fully confirmed the laboratory findings; that is, there was no meningitis at the time of the original operation, except a localized pachymeningitis about the sinus. It is difficult to say why the right labyrinth reacted to the caloric test on the first day on which the patient was seen, and then failed to respond to that test twenty-four hours later, although at the time of operation no labyrinthine fistulà was found. I am inclined to believe, however, that the only explanation of this phenomenon is that we had a thrombus of the internal auditory vein, which caused an edema of the labyrinth, and an increase in the labyrinthine pressure so great as to prevent the circulation of the labyrinthine fluid, and, consequently, prevented the response of the labyrinth to caloric reaction. It is also possible that the inflammatory process, extending along the posterior surface of the petrous pyramid, may have involved either the aqueductus cochleae or the aqueductus vestibuli, and in this way may have caused a coagulation in the labyrinthine fluid. Such a process would prevent absolutely the circulation of labyrinthine fluid, and would thus make the labyrinth inactive to caloric stimulation. The prompt appearance of globulin in the spinal fluid, coincident with the appearance of streptococci in this fluid, seems to show, when coupled with the clinical history of the case, that is, the sudden rise in temperature, that the actual inflammatory invasion of the labyrinth occurred at this time. The sudden fall in the temperature after the second operation, which comprised a complete drainage of the labyrinth, would seem to indicate that the outcome in this case might have been different had not pulmonary embolism intervened.

I regret exceedingly that we were not able to confirm this last diagnosis by autopsy, but the symptoms were so completely those of pulmonary embolism that the diagnosis hardly seems to be in doubt.

DISCUSSION.

Dr. Goldsmith: I wish to congratulate Dr. Dench on his very excellent report. One always likes to hear a person admit that his mistake in diagnosis has been due to his not having been quite careful enough to sum up before operation. His case reminds me very much of one of mine: a boy who had a discharging ear of two years' duration. It was said to be dry for three months before I saw it, with the exception of the previous two weeks, when there was an ordinary discharging ear with some pain and inability to sleep at night. He was brought to me with a temperature 106 degrees, pulse 120. Mastoid not unduly tender, but some tenderness behind the angle of the jaw. I opened the mastoid and for an area the size of a half dollar there was no dura. There was an abscess cavity. The lateral sinus was reduced to a thin white line, practically all sloughed away. I went back further and found a clot, which was removed. In order to get at the posterior part I carried my mastoid incision back and found there was a gap of an inch with no sinus whatever. The vein was resected in the neck. The boy made a perfect recovery. This brings to my mind three cases in which the ordinary mastoid operation was performed and old obliteration of the lateral sinus was found. Some septic process had taken place some years previously. Nature had been able to look out for herself. Dr. Dench speaks about the pain underneath the tip and in front. A week ago I operated on a case in which the sternomastoid extended far up on the surface of the mastoid process. There was no pain in this case, yet the mastoid was extensively involved. The only indications were a discharging ear in a patient who was unable to sleep at night, and who had a pulse of 48 to 50 with subnormal temperature. There was otherwise nothing to indicate brain abscess and the disease was found limited to the bone. I am glad to hear Dr. Dench say that the removal of granulation tissue from the tympanum should not be done without due consideration and continuous subsequent observation.

Dr. Emerson: I wish to say that I had a patient a short time ago with a history of otitis media treated by a family physician until finally a small aural polypus developed. He explained the condition, and was anxious that I should see the case, although he did not think the patient's condition was serious. When I saw the patient I found the canal pretty well filled with a typical polypus. The general symptoms were excellent. Woman, in the neighborhood of forty. Mastoid tenderness was only elicited by deep pressure and this was questionable. Under general anaesthesia I removed the polypus and found that the perforation was small, and the posterior wall was stripped, and general conditions not satisfactory. I urged immediate operation and found the patient's mastoid all broken down and filled with pus. Had I taken out the polypus in the office and then allowed the family physician to take care of the case very serious complications would have resulted.

Dr. Reik: A few years ago we thought we had a fairly definite clinical picture of lateral sinus thrombosis, but the large number of cases recently reported under a modified title, such as "unusual symptoms in," etc., suggest the necessity for revising the text-book descriptions of symptoms in this affection. An interesting point in Dr. Dench's paper is the valuable aid obtained from some of the newer diagnostic measures.

The remark made by Dr. Goldsmith, concerning the possibility of feeling a cord-like swelling in the neck in some of these cases, indicated that he had not found that symptom present in his cases, and, as that corresponds to my own experience, I should like to ask Dr. Dench whether, in his larger experience he has ever found it present or in what proportion of cases he thinks it is present?

Dr. S. MacCuen Smith: I have seen several cases where the polypoid growth has been grasped by forceps and thus removed, and the patients have subsequently developed meningitis and died. This illustrates the danger of such a procedure. I wish to emphasize the importance of the most careful removal of such growths, and believe that patients should remain in the hospital for subsequent treatment. It is most interesting that in Dr. Dench's case the laboratory findings confirmed his own, especially as to the meningitis. It seems to show that further development of our laboratory work, in these complications especially, will make it possible for us to diagnose such cases early, and we shall be able to locate certain intracranial lesions, such as brain abscess.

I have had several cases where the sinus appeared normal at the time of operation, but which later required operation for sinus thrombosis; and in at least one of these patients, it occurred to me to wonder whether some fault in technique might not have caused the symptoms. We have certain characteristic symptoms of sinus thrombosis; nevertheless, it seems possible that if we wait for these symptoms it may be too late to operate.

Dr. Dench in closing the discussion, said he had seen the complete destruction of the lateral sinus resulting from an epidural abscess. In this case, removal of the clot from the extremities of the sinus, after the vessel had been located,—showed the contents of the vessel to be sterile. In this instance, owing to the destruction of the sinus, I excised the internal jugular vein.. The man made a perfect convalescence, which was entirely afebrile. Just as he was ready to leave the hospital, he suddenly became comatose, the temperature rose to 105°, and he died twenty-four hours after the inception of these symptoms, of a meningitis. At the time of the operation for meningitis, the torcular end of the sinus was exposed, and the clot found in the torcular extremity was perfectly sterile, showing that there had been no mistake in the technique at the time of the original operaton. Infection must have taken place through the infiltrated dura. I have also seen one case in which the lateral sinus was converted into a cordlike band, as the result of a previous inflammatory process. In other words, there had been a previous sinus thrombosis, with complete obliteration of the lateral sinus.

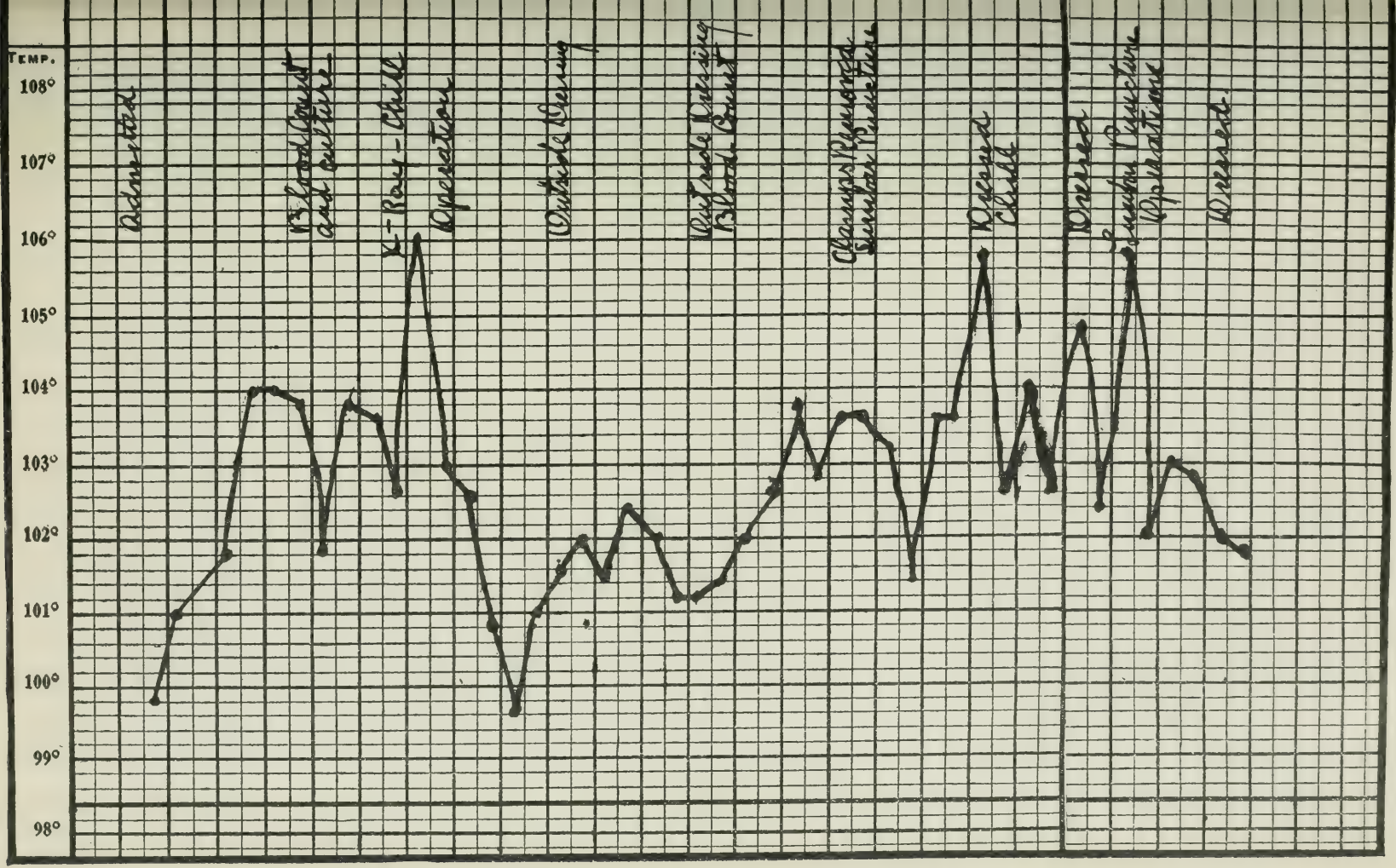
In reference to tenderness at the angle of the jaw, as a symptom of jugular thrombosis, I have found this tenderness in certain cases, and it has always been due to enlarged glands. I think this glandular enlargement at the angle of the jaw, is one of the most common symptoms of sinus thrombosis which we have. I agree with Dr. Reik, and would state positively that I have never seen, in any case of sinus thrombosis, the hard, cordlike swelling in the neck, which is mentioned by Sir William Macewen, in his admirable book, as such a prominent symptom of jugular thrombosis.

I believe there is a large proportion of cases where conservative treatment of middle ear suppuration is advisable. The only objection to conservative treatment is that one never knows how far the suppurative process has involved the tegmen tympani, tegmen antri, and the covering of the sinus. The most careful examination of the diseased region, through the external auditory canal, can give us no information regarding the extent of the disease, beyond the field of vision. Since I have been doing the radical operation more frequently for chronic middle ear suppuration, I have operated upon many cases which ten years ago, I would have said would have been cured by a simple ossiculectomy. At the time of operation in many of these apparently simple cases, I have found the bony roof of the tympanic vault or of the tegmen antri, entirely wanting, and the exposed dura presenting in this region. Such cases operated upon by the so-called conservative method, would naturally be subjected to danger of infection and the subsequent development of a meningitis. Therefore, while I believe

that there is a place for conservative surgery of the middle ear, it is a question, I think, at the present time, as to exactly what cases are to be submitted to this conservative treatment. I feel that in performing the radical operation, where the parts are brought under direct ocular inspection, there is much less danger of serious complications following the operation, than where the so-called conservative method is employed. I do not condemn the conservative treatment of these conditions, but it seems to me that the so-called radical operation is really the conservative plan of treatment.

I should like to speak of those cases where sinus thrombosis occurs one, two or three days after operative interference upon the mastoid, and where a small area of sinus has been exposed at the time of the operation. In every case where I expose a small area of the lateral sinus accidentally, I always make it a point to continue the removal of bone until the sinus is exposed over an area of, at least, three-quarters of an inch in length. I believe that a small area of exposed sinus is much more apt to be followed by sinus thrombosis than where the bony covering of the vessel is removed for a considerable extent. I think that it is the same difference as between pricking your finger with a poisoned needle or making a good free incision with an infected knife. The first accident would probably be followed by infection, the second would probably not. I believe that the reason why thrombosis occurs when only a small area of the sinus is exposed, is that when,there is a small area of exposure, the vasa vasorum of the sinus become clogged, the nutrition of the vessel is interfered with, and infection of the wall of the vessel takes place at this point. Subsequently, a parietal clot develops. If a large area of sinus is exposed, the nutrient vessels of the sinus wall are able to take care of any slight superficial infection of this wall, this infection is not transmitted to the inner wall of the sinus, and a parietal clot does not form.

In reply to Doctor Wilson's question as to whether a positive blood culture is indicative of a clot in the sinus, I would say that, given a suppurating ear and a positive blood culture, a man who did not investigate the lateral sinus would do wrong. The positive blood culture, under such conditions, is the strongest evidence we can have, of an infectious thrombus within the sinus.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Rash Inside Arms
Blood Count
Chamydia Pneumonia
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Discharged

TWO CASES OF OTITIC BRAIN ABSCESS.

By S. MacCUEN SMITH, M. D., Philadelphia, Pa.

Two of the cases that I have the pleasure of presenting to you today have been shown before the Section of Otology and Laryngology of the College of Physicians of Philadelphia, but are of sufficient interest, I feel, to be again brought to your notice. The first case, however, that of the eight-year-old child, is still under care and shows the results of an evacuated brain abscess formation, especially in the relief of the neurological symptoms.

In the majority of my cases, I am impressed with the absence of diagnostic data that will enable us to state that an abscess formation is present, or more particularly, its actual location, with these exceptions,—the presence of word-aphasia in a left-sided temporal abscess formation, and that indescribable clinical picture as seen in the facial expression. Indeed, I have been compelled, in most instances, to rely principally on these two symptoms, and regret that I am unable to definitely define the facial expression above referred to, but am sure you have all had a like experience.

Another symptom which has been so constant in patients coming under my observation that I am inclined to believe it pathognomonic of an abscess formation involving the temporo-sphenoidal lobe of the brain is the very severe pain in the frontal region of the affected side. Indeed, this symptom has been so unfailingly present and so severe in the average case, that one might readily be deceived in thinking the abscess formation was in the frontal lobe.

Of course, in the small minority of cases we are able, by certain tests, including the eye, blood and neurological examinations, to state with more or less accuracy that a given patient is suffering from a brain abscess formation, and we might even be able to state its location with some degree of certainty; but if these same rules are applied to the average case, we would fall far short of proving our point, so, after all, personal observation, together with intuition, which comes only from large experience, must be depended upon to aid us principally in our diagnosis and localization of intracranial lesions complicating aural disease.

I wish again to bring out one point which I feel is of the greatest importance: When possible, follow the path of infection through the tegmen antri or tegmen tympani, when searching for a brain abscess formation, as this not only favors drainage by gravitation, but also lessens the possibility of lighting up new infection by going through the skull at some other point.

Case I. D. P., aged 8 years, was admitted to the Jefferson Hospital, October 24, 1912. Her family history was negative. Three years previous to this time the child had scarlet fever, complicated by an acute otitis media of the left side, since which time the discharge has been constant except for two periods of about three months each, when it ceased. Just prior to the acute exacerbation, the child would become especially irritable and mentally confused.

In the spring of 1912 the child became restless and quarrelsome, lapsing from her naturally cheerful disposition to one irritable and morose, and growing progressively worse. About a month before she appeared for treatment, she fell and struck on her head, in the frontal region. Following this blow, she had severe, persistent frontal and left temporal and parietal headache, with extreme nervous irritability, vomiting and intermittent delirium, principally nocturnal, and was able to retain but very little food. One week after the injury she had a convulsion.

Examination on Admission. The child is fairly well nourished, temperature normal, and pulse 53. Chest and abdominal examinations are negative, as are also the laboratory reports on blood and urine, and the neurological and ophthalmological reports.

Left Ear. The canal is filled with a quantity of brownish-yellow, foul-smelling pus. There is moderate drooping of the superior and posterior wall of the canal, but no tenderness over the mastoid process. There is entire absence of the tympanic membrane and ossicles, and the mucosa lining the tympanic cavity is very red. The X-ray report, by Dr. Manges, shows the mastoid cells on the left side filled with pus. The right side is normal. Skull has very much the appearance of an internal hydrocephalus, but there is no evidence of brain abscess.

Operation. A radical mastoid operation was performed on October 29, or five days after admission. The cortex of the mastoid was very hard, and upon its removal the antrum was found to be almost obliterated. The sinus was in about a normal position. There was a carious exposure of the dura through the

tegmen antri about one-fourth of an inch in diameter. The walls of the antrum and the few cells that still existed were covered with a peculiar membranous material.

The case followed an uneventful course of convalescence after the mastoid operation, but the marked irritability continued.

A Wassermann test was positive and the patient was placed on inunctions and potassium iodid, without any change in the clinical picture.

The child was allowed to return to her home in central Pennsylvania in about one week, owing to her extreme homesickness, but on the following day she had a second convulsion, and was immediately brought back to the Jefferson Hospital, where she was kept under observation for two weeks, when she developed measles and was sent to the Municipal Hospital, from which place she returned to her home one month after the mastoid operation. For a fortnight her condition was much improved, when suddenly, without apparent cause, the severe headache over the left frontal region returned and her mental state became noticeably worse. She could not recall the names of people whom she had known all her life, nor associate names with the corresponding objects. For instance, she called a knife a ring, but said it was used to cut. Her chief complaint was headache.

The patient was returned to Philadelphia and admitted to the Germantown Hospital six weeks after the mastoid operation. An examination showed the ear to be in good condition. The temperature was 98.8°, the pulse 98, and respiration 26. The urine and blood examinations were negative.

The eye report showed pupils equal, reaction normal except outward rotation of the right eye, which was practically nil. Eye grounds,—media clear, discs swollen and margins everywhere obscured; best seen with A+5. Retinæ edematous, blurring the blood vessels. Small veins tortuous. No hemorrhages seen.

The neurological report showed no exaggeration of patella reflexes. No ankle clonus. Babinski slight on both sides. Romberg's sign present on both sides, worse on right. Some rigidity of muscles at nape of neck. Masseter muscles contract firmly on both sides. There seemed to be no paralysis involving facial nerve on either side. Paralysis of abducens on either side. Grips equal, but not vigorous on either side. Patient was extremely irritable and suffered from almost constant frontal headache.

Four days after admission to the hospital, under general anesthesia, we reopened the mastoid wound, with a view of exploring the interior of the skull, hoping to locate and evacuate the suspected brain abscess. The process of repair was found to have gone on very rapidly. The exposure of the dura was enlarged by the removal of a lateral plate of bone for a distance of about ½ inch. There was no pulsation discernible in the dura and it seemed to be under considerable pressure. The dura was incised and a pair of Jackson's brain forceps was introduced towards the temporo-sphenoidal lobe, along the avenue of invasion, for a distance of about 1½ inches, when there was a free escape of a greenish, odorless pus, two ounces of which were collected in test tubes, and it was estimated that about another ounce escaped. A drain was introduced, and the patient returned to her bed in a decidedly exhausted condition, it being necessary to employ normal salt solution intravenously, after which she reacted well. An examination of the pus showed few organisms present, staphylococcus pyogenes albus predominating. No tubercle bacilli.

Twelve days after the operation the patient was totally relieved of all suffering, her mental state was virtually normal, and she could recall many incidents that occurred several years previously.

Six weeks after the brain abscess operation, notwithstanding our efforts to keep the external wound open, it had closed sufficiently to require reopening, which was done under general anesthesia.

Case II. W. S., male, aged 37 years. When ten or twelve years of age he had an attack of scarlet fever, complicated by a suppurative otitis media of the left side, which has been recurrent ever since, a period of about twenty-five years. The longest period between attacks was from two to three years. During this time he maintained a state of good health. On two different occasions, ten years or more ago, his physician removed a polypoid mass from the ear.

Examination showed the left ear to be well filled with a brownish-yellow, foul-smelling discharge, notwithstanding it had been cleansed thoroughly about an hour before. This discharge was escaping through a large perforation in the posterior-superior quadrant of the drumhead, involving almost one-half of this part of the membrane. The tympanic cavity was well filled with a

large mass of granulation tissue. Considerable discharge was also escaping through a large, carious opening about the middle of the posterior osseous canal, through which a probe was passed directly into the antrum and revealed much carious bone. He suffered from attacks of vertigo about once in each week, of sufficient severity to cause him to fall unless he promptly received support. The patient believed that he was entirely deaf in this ear, although he could hear the tuning-fork in close proximity to the concha. Bone conduction was greatly reduced from normal. No tenderness was elicited on pressure over the mastoid. On account of his apparent good health and in consequence of absence of suspicion of intracranial lesions, the usual preliminary examinations of blood and eye-ground were not made.

Operation. The radical mastoid operation was performed at the Jefferson Hospital, March 4, 1909. The cortex was found to be very thick and hard, with the exception of the mastoid tip, which was soft and necrotic. The antrum was reached with difficulty on account of the dense, eburnated bone. As soon as the latter was opened, a quantity of pus gushed out, as though it had been under some pressure. When this was cleaned away, the pus was seen to escape through a carious opening in the tegmen antri and through the dura. A probe was introduced through this opening into the interior of the skull, the sinus apparently leading into the temporal lobe. A pair of Jackson's brain forceps was then introduced and separated, which permitted the escape of additional pus. Proper drainage was provided, and the patient made a slow but uninterrupted recovery.

The chief point of interest in this case is that the patient apparently suffered no inconvenience at any time from this pus formation located within the interior of the skull, unless we may attribute his spells of vertigo to this cause. It would, of course, have been most interesting to have had a record of his visual fields and a differential blood count.

The patient made a complete recovery, entire dermatization taking place within a year. At this time, four years after the operation, he hears the tuning fork at about six inches, which is a gain of more than five.

Case III. E. C. B., aged 25 years. This patient had measles at the age of two or three years, complicating which he had an acute suppurative otitis media of the left side. The discharge in this ear has continued recurrently to date (March, 1912.)

especially during the winter months, and during the winter just passed it has been especially active and profuse. Since early in February, or about six weeks, the patient has suffered from vertigo, which is aggravated by bending the body or by quickly turning the head, in any direction.

When examined, the external auditory canal was well filled with a collection of pus and desquamated epithelium. Upon the removal of this mass, we found an entire absence of the membrana tympani and ossicles, they having become disintegrated and escaping in the discharge, probably some years ago. A bent probe introduced into the antrum shows that the cells comprising the tip have become obliterated through sclerosis. The greater part of the superior and posterior osseous canal is destroyed, from the tympanic cavity back to the mastoid antrum, all of which, except the tympanic end of the Eustachian tube, seems thoroughly dry and shows complete dermatization. Bone conduction is little, if any, reduced. Hearing for C-tuning fork, aerial conduction, is only one-half inch.

Various tests indicate that the patient has a marked vestibular disturbance, more especially involving the superior and horizontal semi-circular canals.

The X-ray report showed the mastoid to be of the chronic sclerotic type, with considerable bone defect in the region of the antrum cells.

The neurological report showed no symptoms other than deafness and vertigo. There were no central symptoms. The patient was not hysterical nor neurasthenic.

The ophthalmological findings were compound myopia, requiring reglassing; otherwise eyes healthy.

DISCUSSION.

Dr. Dench: I was much interested in the subject of facial expression as a symptom of brain abscess. I have never found it of such great value in making a diagnosis, but am glad to have that point brought to my attention, especially because if the abscess lies on the right side we are frequently in doubt as to the diagnosis. The frontal pain of which Dr. Smith speaks is quite characteristic of abscess located in the cerebellum. There is no reason why, in temporosphenoidal abscess it should not be in the same location. In my cases headache was never limited to the site of the abscess. That is a distinctive symptom between an epidural abscess and one in the substance of the brain. In epidural abscess the pain is almost always located over the abscess. Change in the disposition of the patient I consider characteristic. In a case operated upon last year the patient was about as disagreeable a girl as is ever seen, but after the evacuation of the pus she became very sweet-dispositioned. The change in the disposition is probably due to the tremendous suffering which these cases

experience, relief of which permits them to return to their normal disposition. Mental depression is a strong diagnostic point. In three cases of mine there were frequent crying spells without apparent cause, and all felt certain they were going to die. It is a characteristic symptom. In reference to Dr. Smith's last case—a radical operation performed by Nature—I have seen a number of such.

Dr. Makuen: Dr. Smith's and Dr. Dench's papers seem to emphasize the importance of early diagnosis in these complications of ear disease. With our improved technic we can now be so sure of the conditions before we operate that it is scarcely possible to make a mistake. About two weeks ago, I was called to see a patient who had typical symptoms of meningitis. The family physician was a clever man with considerable experience as a general surgeon. The patient was a student in the Pennsylvania Military College, and had been under observation for about three weeks, during which time the diagnosis was uncertain. Malaria was suspected and possibly typhoid fever, until suddenly there developed the meningitic symptoms, and I was called in. The boy had no ear disease nor had he ever had any. He had had the middle turbinate bone removed on account of some intranasal obstruction, but that was done a year previously and there was no nasal discharge. I happened to have with me a little case of electrical diagnostic instruments, and upon transilluminating the frontal sinuses, I found that the left supraorbital region showed dark, especially over the outer portion of the orbit, the light zone extending from the supraorbital notch on the left side all the way across the right supraorbital region, thus giving an exact interpretation of what was later found to be the condition of the sinuses. I then learned that the patient had complained for five or six weeks of dull aching sensations in the head, and for two or three weeks of more distinct pain localized in the left supraorbital region. These symptoms, together with the result of the transillumination test, seemed to warrant an immediate opening of the left sinus, with a view of finding and removing the cause of the meningitis. I may add that a blood count also indicated the presence of pus somewhere in the patient's anatomy. Our X-ray department was not at the time in operation, and the patient anyway was almost too ill to be subjected to this operation. Had I had complete confidence in the transillumination test, I should have at least surmised that we had to deal with asymmetrical sinuses and I should have made my opening at a point to the left rather than to the right of the supraorbital notch on the left side, but not having such confidence I made the opening to the left of the median line of the skull and thus opened a normal right frontal sinus, which extended quite over to the left supraorbital notch. My assistants immediately came to the conclusion that our diagnosis after all was incorrect and that we were about to fail to find a suppurating cavity. However, I at once enlarged the opening in the skin and periosteum, and upon puncturing the outer wall further to the left we found a very narrow but deep left frontal sinus completely filled with thick pus slightly under pressure. The mucous lining of the cavity was entirely destroyed, and when the pus was washed out we found little but bare bone. The cavity was so deep that I thought it must be in communication with the brain, and after a thorough cleansing it was packed lightly with sterile gauze, and the patient returned to bed. There was a noticeable improvement in the condition of the patient for a day or two, but death occurred from the meningitis about a week later. No postmortem examination was allowed, but a careful examination of the sinus at the time of the dressings revealed no necrosis of the inner wall of the sinus and no connection with the brain. Moreover, I could find no frontonasal duct leading to the left sinus, although a careful probing was made for it, both through the nose upward and from the cavity itself downward in the direction of the

nose. Nor could I find any positive indication of sphenoidal disease by my intranasal examinations. I have described this case more or less in detail because we find in the literature comparatively few reports of fatal meningitis resulting from frontal sinus disease.

Dr. Reik: Without in any sense criticising the findings in this particular case, I should like to call attention to the possibility of making mistakes when employing the ophthalmoscopic examination for diagnosis in such instances. When Dr. Cushing called attention to the frequency with which he found blurring of the disc margins associated with increased intracranial pressure we all began to consider it seriously as a diagnostic measure in otitis media accompanied by symptoms suggesting brain abscess. I called attention at that time to the necessity for paying special attention to the refractive condition in these cases before deciding that actual swelling of the nerve head existed. Unless the examiner is skilled in the use of the ophthalmoscope it is an easy matter to mistake the appearance produced by a high grade of hypermetropia or of hypermetropic astigmatism for a blurred or swollen disc margin. I have known this mistake to be made. Not very long ago a patient was brought to me in great distress because she had been told that she had some serious brain lesion and that an operation might be required. Ophthalmoscopically it was a striking picture of tortuous retinal vessels and blurred disc. Refraction examination revealed a high degree of astigmatism in that eye, which, when corrected, brought the vision up from 20/200 to 20/20 and disposed of any need for cranial exploration.

Dr. Wilson: I do not think that Dr. Reik wishes it to go out that he considers that this condition very frequently occurs, because that is not a fact. The fact is it is rarely found, and in most cases can be differentiated from astigmatism upon examination of the eyes.

Dr. Reik: If I may be permitted to reply, I do want to insist that I believe these errors do occur with sufficient frequency to demand our requiring the opinion of an expert in the use of the ophthalmoscope before concluding that the apparent disc swelling is due to intracranial pressure. I had some of my associates examine the patient of whom I have just spoken, and they one and all said at first that it was an optic neuritis; the picture was typical. It is true that refraction measurement, even with the opthalmoscope, ought to settle the question, but it is so easy to be satisfied when one has found what he is looking for, so easy to neglect a refraction test or even not to know of its importance, and so difficult for those who can use the ophthalmoscope but are yet not over proficient with it to be sure of the matter, that I think it worth insisting on the point.

I want to repeat that what I have said does not really apply to the case reported by Dr. Smith. No doubt there was a blurred disc in his case. I took advantage of the opportunity to warn against operating in similar cases, upon the statement that the optic disc was not normal, unless that examination had been made by one really expert in the use of the ophthalmoscope, and to point out one condition that may easily cause an error in diagnosis.

Dr. Goldsmith: I think the last case is one of cholesteatoma in which Nature so arranges things that the mastoid is bowled out. I believe this bowling out has gone on for years and the posterior bony wall has become eroded. As the cavity is dry and nothing has been done to it we are probably looking at the matrix of the cholesteatoma.

Dr. Smith, (closing): I should have felt decidedly disappointed if I had not been criticised on account of the manifest delay in operating on this patient. We are sometimes criticised because we are radical, and again because we are not radical enough, and I believe this is due to

the fact that we are all trying to do the best for our patients, and sometimes fail to operate sufficiently early. In this first case, we had a suspected internal hydrocephalus, as shown by the X-ray. While in the Jefferson Hospital there were no signs of intracranial lesion, except that the child was irritable and had had a convulsion, which was properly attributable to the supposed hydrocephalus. After her return home, and subsequent admittance to the Germantown Hospital, in the face of these neurological reports (which I credit to Dr. Charles H. Frazier) there was no longer hesitation about operating. We operated, evacuated pus, and the child is well, as you have seen from your examination of her, up to the present time. But, gentlemen, when there are a number of surgeons, neurologists, X-ray men, etc., seeing a case, we sometimes have too many opinions, and while I was quite convinced that this was a case of brain abscess, some of my colleagues did not think so, and others were entirely opposed to my view. Regarding the eye-report, I would say that I am not personally skilled in ophthalmological examinations, but this case was examined by Dr. Carl Williams, a very competent eye man of the Germantown Hospital, and we accepted his report as to the eye findings.

Dr. Goldsmith has spoken of the possibility of the case of mastoid exenteration being a cholesteatoma, and I think that is probably correct, although there was no cholesteatomatous material in the cavity when I saw the patient.

THE TECHNIC OF THE INTRANASAL OPERATIONS UPON THE LACRIMAL APPARATUS: DEMONSTRATIONS ON THE MANNIKIN.

By SIDNEY YANKAUER, M. D., New York City.

The inflammatory conditions of the lacrimal drainage apparatus result in stricture of the lacrimal canal, in mucocele, suppurative dacryocystitis; and the epiphora which accompanies these conditions is extremely distressing to the patients. The treatment of these conditions in the hands of the ophthalmologists has been unsatisfactory. Treatment by probing is prolonged, painful and disagreeable, and rarely results in a cure. The radical removal of the sac, by the external route, is a deforming operation, and while the suppuration is cured thereby in a large percentage of the cases, a more or less distressing epiphora remains as a permanent disability, in spite of the removal of the lacrimal gland. Now, it is a fact that 95% of these conditions have their origin in intranasal disease. For this reason rhinologists have during the past 12 years attempted to perfect an intranasal operation for the relief of the condition. A summary of these attempts can be found by consulting an article by Onodi in the Monatsscrift für Ohrenheilkunde und Laryngo-Rhinologie, Vol. 46, Heft 4, and one by Polyak in Semon's Internationales Centralblatt für Laryngologie, September, 1912.

After about three years' experience in this field, the writer has abandoned these methods, and has devised a technic which he believes is based upon correct surgical principles. A full discussion of these operations was published by the writer in an article in the Laryngoscope in December, 1912, where the technic of his operation is described in the following manner:

Briefly stated, it consists of the following steps: Temporary elevation of the mucous membrane of the outer nasal wall; resection of the bony wall of the duct; slitting open the entire membranous canal from below its nasal orifice up to and including the sac, thereby dividing all strictures, destroying the venous plexus surrounding the canal and evacuating pus; and finally, replacing the mucous membrane of the outer nasal wall. The end-result of the operation is the enlargement of the bony and

membranous passages, and the re-establishment of drainage in the manner originally designed by nature.

The details of the technic are as follows: Previous to the operation the patient receives an injection of morphin or morphin-skopolamin. The patient is placed in the semi-recumbent position on an operating table, the operator standing by his side. This position is desirable because the field of operation is located so far anteriorly in the upper part of the nose that the operator's eye must at times be on a level with the patient's chin.

The interior of the nose is anesthetized with a solution of 10 per cent cocain and 1 to 2,000 adrenalin, by spray or application in the usual manner, special attention being given to the under-surface of the lower turbinal. If the lacrimal canal is pervious, a weak solution of cocain-adrenalin may be injected into the canal through the lower punctum. If it is not pervious, an attempt may be made to inject the canal from below, after locating its nasal orifice with the Holmes naso-pharyngoscope. These measures usually render the field of operation insensative and ischemic, but if necessary they may be supplanted by subperiosteal injection of weaker solutions along the line of incision in the nose, and upon the outside of the nose below the inner canthus.

A self-retaining speculum adds to the convenience of the operator. As the outer nasal wall is directed obliquely backward and outward from the nostril, a better exposure is obtained if the septum is retracted toward the opposite side. For this reason, a speculum which opens the nostril from side to side, like Myles' speculum, is preferable, even though it must be held in place by an assistant. Freer's retractors can also be used.

The incision is begun at the anterior end of the attachment of the middle turbinate bone with an angular knife. It extends horizontally forward for a distance of 0.5 cm. From this point it is continued downwards with an ordinary scalpel to the anterior end of the attachment of the lower turbinal, and then backward along the extreme edge of the lower turbinal for a distance of about 2 cm. (Figure 1, A B C D). The incision is made down to the bone, and the irregular muco-periosteal flap thus outlined is elevated. The lower half of the lower turbinate bone is very rough, and the separation of the muco-periosteum requires a sharp elevator. Occasionally it is necessary to facilitate matters by cutting with the scissors the prolongations of periosteum which extend into the deep pits on the surface of the bone. The

flap is turned backwards, its upper part being tucked under the middle turbinate, where it is held out of the way during the entire operation.

The muco-periosteum is then separated from the outer surface of the turbinal in order to remove the anterior third of the bone As the outer surface of the bone is just as rough as the inner surface, the muco-periosteum is elevated for a short distance at a time and the bone punched away in small pieces (Figure1). The preservation of the mucous membrane of the outer surface of the lower turbinal is necessary to prevent contraction of the nasal orifice of the canal after the operation. When the anterior end of the turbinal is much hypertrophied, its lower edge may be removed *in toto* with the punch-forceps.

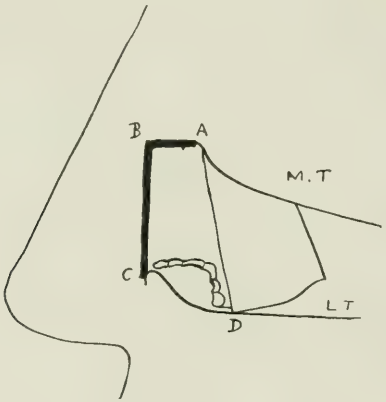


Figure 1.

The line of attachment of the turbinate bone to the outer nasal wall curves upwards from its anterior end, and the bone must be removed close up to its attachment and as far back as the posterior margin of the nasal orifice of the duct.

When the lacrimal canal has not been cocainized and adrenalinized, owing to the obstruction at the neck of the sac there is apt to be some pain and considerable bleeding from the veins surrounding the membranous canal, at this stage of the operation. In order to inject the lower part of the canal from below, it is necessary to locate its nasal orifice. This is done by raising up the outer turbinal mucous membrane with an elevator and inserting a probe, the end of which is bent upwards for about 4 mm. If the probe is inserted anteriorly and moved backwards, it will glide over the valve or fold of Hasner, and will not enter the

canal. It is preferable to insert the probe some distance back and to move it forward, so that its end will pass under the fold of Hasner and enter the canal. When the nasal orifice of the membranous canal can not be found, the canal may be injected by plunging a hypodermic needle, bent at right angles through its wall at the nasal orifice of the bony duct.

The precise localization of the nasal orifice of the bony duct is an important step in the operation, as the removal of the inner wall of the duct is begun at this point. When the orifice is normal in size its localization is not difficult; but when it has become stenosed as a result of the disease it is not always easy to locate it with certainty.

After the removal of the anterior third of the lower turbinate bone, a stump is left which forms an elevation on the outer nasal wall. Below this line of attachment, the mucous membrane of the outer turbinal surface is reflected upon the outer nasal wall. The naso-lacrimal duct, as above described, is continued below the lower turbinal in the form of a groove, whose anterior edge forms a distinct ridge on the outer nasal wall in front of the orifice of the duct. If, now, the right angled probe is placed on the outer nasal wall just below the stump of the turbinate, above the reflection of the mucous membrane, in front of the orifice of the duct, with its point directed outwards, and then moved backwards, the point will glide over the ridge, and will suddenly disappear in a lateral direction in the hollow of the nasal duct. The point of the probe can be turned upwards, and by moving it back and forth and from side to side, definite information as to the size, shape, and location of the orifice is obtained.

The next step is the removal of the inner edge of the nasal orifice of the duct. This is a thick, hard piece of bone. The use of a chisel for this purpose would endanger the antrum. A suitable forceps could not be found, so that it was necessary to design a special forceps for the purpose. This forceps has a small but stout jaw, turned upwards nearly at right angles to the shank. After separating the membranous canal from the duct by means of the right-angled probe or the hook-shaped elevator, the male blade of the forceps is introduced into the duct and the bone cut through.

The anterior edge of the nasal orifice is now removed. This must be done with the chisel, the most suitable being a gouge, bevelled from the inside. As the chisel-cut ends in the incision previously made by the forceps, the antrum behind the orifice

can not be injured. To avoid injury to the antrum in front of the duct, which may occur when a deep infra-orbital recess lies close to the surface of the nasal wall, the bone is removed gradually, in thin shavings, the probe being used after each cut. The cut in the bone is deepened until the entire width of the membranous canal can and should be carefully avoided.

The management of the nasal orifice, especially when it is small, is one of the chief difficulties that is met, but when once the membranous canal has been brought clearly into view, the operation proceeds with greater celerity.

Above the nasal orifice the inner wall of the duct is thin, the anterior wall thick and dense. The inner wall is removed with the forceps, and, to avoid injury to the ethmoid cells which lie behind the duct in the middle part of its course, this is done

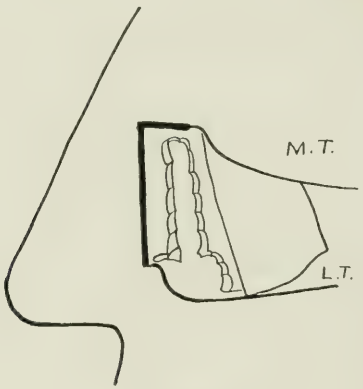


Figure 2.

first, before the corresponding part of the anterior wall is attacked with the chisel. As the upper parts are reached, an ordinary straight nasal punch is more easily adapted to the parts than the special forceps.

When the neighborhood of the orbital orifice is reached, the gouge can not be applied to advantage. For the enlargement of this orifice the guarded chisel which the writer devised some years ago for the enlargement of the fronto-nasal duct is the most efficient. When the foot of this instrument is passed through the orbital orifice, it can be seen and felt through the skin below the inner canthus of the eye. The upper limit of the cut in the bone is reached at the level of the attachment of the middle turbinate bone. When sufficient bone has been removed the entire lacrimal

passage is clearly visible, from the middle of the lacrimal sac down to the nasal orifice, (Figure 2).

The next step in the operation is to slit open the entire membranous passage. As the inner wall of the canal is continuous with the muco-periosteum of the outer turbinal surface, the incision is begun at the lower edge of this muco-periosteum, with a curved nasal scissors. The nasal orifice of the canal is sometimes obscured by the presence of a well-marked fold of Hasner. This is cut through with the scissors. When there is no stenosis at the neck of the sac, the incision is extended up to the middle of the sac with the scissors. When the sac is filled with pus or mucus, its lumen is separated from the lumen of the canal by a complete stenosis near the neck of the sac, caused by inflammatory adhesion of its walls. As long as the fluid remains in the sac

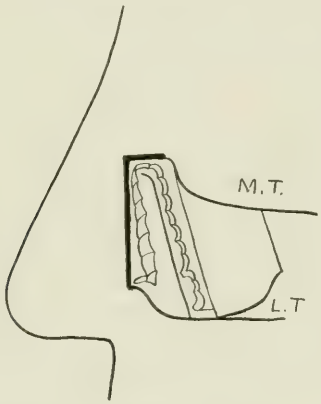


Figure 3.

these adhesions cannot be separated. The sac is therefore opened by inserting a hook-shaped knife into it as high up as possible, and cutting downward to the neck. After the contents have been removed, (by irrigation if they are purulent), the right-angled probe is inserted into the sac with its point downwards, and as the adhesions are separated, the neck of the sac is opened with the scissors, or by cutting down on the probe with a small knife, (Figure 3). The incision in the membranous canal is made as far back on its inner wall as possible. The part of the canal wall in front of the incision is brought forward, and laid against the bone.

The mucous membrane of the outer nasal wall, which during the entire operation has been tucked away under the middle

turbinal, is now brought forward and returned to its original position. It may be held in place by a single suture at its anterior inferior border.

When there is pus in the lacrimal sac, a piece of the flap about 4 mm. in diameter is removed from its upper corner in a position corresponding to the incision in the sac to provide direct drainage into the middle meatus of the nose.

After the operation the nostril is packed with gauze to prevent hemorrhage and to insure perfect co-aptation of the entire flap. The packing is removed after twenty-four hours and the lacrimal passage irrigated with normal saline solution. When there is pus in the sac, the opening in the middle meatus remains patent. In such cases the sac is irrigated daily with the salt solution.

During this time there is some epiphora, and when the patient blows his nose air is driven through the fistula into the eye. When the suppurative inflammation has subsided and drainage has become re-established through the natural passages, the opening in the middle meatus closes. To determine when this opening has completely closed I have employed the following test: A pledget of dry absorbent cotton is inserted into the middle meatus, and a second one in the lower meatus, below the lower turbinal and at about its middle. A thin watery solution of starch is then injected into the sac through the lower punctum. After a few minutes the cotton pledgets are removed and tested for starch by means of a solution of iodin. When the pledgets from the middle meatus remains unaltered by the iodine, while that from the lower meatus turns blue, we know that none of the starch solution escaped into the middle meatus, and that the lacrimal passage has resumed its normal function.

The writer has operated upon nine cases during the past three years according to the technics here described. The number would have been greater were it not for the fact that these patients consult the ophthalmologists, and not the rhinologists.

Of the nine cases, two were cases of mucocele of the sac, the other seven were suppurative. Of the latter, three had intermittent attacks of suppuration only, and were operated during the intervals. The other four had pus in the sac at the time of operation. The cases were all of long standing, from one to three years. The first case was operated in 1909, the last case six months ago.

The suppuration ceased in all the cases after the operation, and has not recurred in any of them. The epiphora was completely

relieved in all but one of the cases. This was a case of suppuration in both sacs, operated two years ago. In one eye there is still a slight degree of epiphora, which is noticeable only when the patient has a cold in the head.

In one case, a patient with pus in the sac for over a year, I first opened the lacrimal canal in the middle meatus in a manner similar to the operation of West. The suppuration ceased after the operation, but the artificial opening gradually contracted and the sac filled up with mucus. I thereupon completed the operation by a submucous resection of the anterior third of the lower turbinal, and enlarged the nasal orifice of the bony duct, which was stenosed, and only about 2 mm. in diameter. The improved drainage established by the second operation stopped the accumulation of mucus in the sac. The opening in the middle meatus also closed. The epiphora has been completely relieved, and the patient has remained well for two years, to date.

DISCUSSION.

Dr. Worthington: I have done a number of these operations. The results at first looked brilliant. My work has all been done for and with the ophthalmologist, I think the cases have all re-obstructed. The method I use is, I think, something like that as described by Dr. West. The lachrymal probe was introduced into the sac. I devised a curved chisel for opening the bony canal and also modified an instrument which Dr. Yankauer once sent me——a little angular elevator for entering the lacrimal sac. I operated with the lacrimal probe in the sac or canal.

Dr. Lutz: I have not done a great deal of this work; I have done only four cases. In two of these there were double weeping eyes, and it is quite remarkable to notice the difference between the eye that has not been and that which has been operated upon. The last two cases are not far enough advanced to determine whether their eyes are satisfactory to them or not, but they say yes. My experience with this work has been about four months. I had some difficulty in getting cases at first. Eye-men are usually satisfied to have these cases return and be probed. They do not do it themselves in the dispensary because it is the work of the internes. Most eye-men at the hospital where I have a clinic have scoffed at this operation because they said the operation for the removal of the sac was ample and left a dry eye in a great many cases, but as Dr. Yankauer said, there are a great many of these people who have had their tear-sacs operated upon but are still uncomfortable because they have fluid in the eye, and it runs over. They are better off than before, but not as well as they might be. In doing this operation, I have found that one of the hardest steps in the operation was to detach the mucous membrane from the septal side of the lower turbinate, and from the outer side of the anterior end of the lower turbinate. As Dr. Yankauer says, after you get the bony opening of the duct, and the membranous opening of the duct differentiated, you do not have much more trouble. It is not an easy procedure because the field is foreshortened and the space small at all times. I have been able to prove in a few of these cases that we did have the duct exposed, because, after I had exposed the membranous portion of the duct, it was suggested that we pass a sound

so that on-lookers could see it in position; this was done and it bellied out the mucous membrane of the duct. In the last case I did I had the same experience as Dr. Yankauer. One of the eye-men passed the probe and perforated the duct just under the middle turbinate, and the probe could be seen bare in the nose above the lower turbinate. The last case I did was a suppurative case with pus in the inner canthus of the eye; the pus could be forced into the nose when the inner canthus was pressed. The little opening made high up under the end of the anterior turbinate healed up in about a week and the tears were draining into the lower meatus without any trouble. I saw one case with a perforation through the bony duct from the inner side of the nose. This case has been operated upon by some other method. She complained that she blew nasal mucous into her eye. She did have a hole there just under the anterior end of the middle turbinate. I think the principal point in the operation is in slitting the canal far back and turning free the cut edge over the surface that has been chiseled away, because we get a wide-open canal, and the inner lining of that canal is made by replacing the mucous membrane from the nasal wall. It is surprising to note the extreme thickness of the bone at the anterior attachment of the lower turbinate and high up just before the sac is reached. It takes a number of hammer blows on the chisel to cut away the bone. The utility of the operation was demonstrated especially well on the first two cases of mine, because they were double epiphora cases; they are going around now with one dry eye and one wet eye, and both patients perfectly willing to have the operation done on the other eye.

Dr. Makuen: I would like to ask if this is an operation that requires very special skill and dexterity Dr. Lutz has spoken of the difficulties of dissecting the periosteum from the turbinate bone, and it would seem to me that the difficulties of starting the dissection in the nostril would be not inconsiderable. I would also like to ask whether anything serious would be likely to occur from tearing the muco-periosteum in the effort to elevate it. I have a patient now who has an obstruction of both tear ducts, and the operation appeals to me but I have just resected his nasal septum and I had so much trouble with it that I confess I should hesitate to undertake this, as it seems to me a somewhat more difficult task.

Dr. Chambers: The removal of the sac does not always cure: Three years ago I had a woman who came to me with weeping eye, and I passed a probe down into the nose. After I had probed she reported to me that her sac had been taken out by one of the most noted men in New York City a few years before. The probing lasted about two years and she came back. The probe went alongside of where the sac had been taken out evidently through the lacrymal canal which was a means of infection of the eye and stoppage of the normal secretion of the eye. I think this is a plea for the operation of Dr. Yankauer.

Dr. Yankauer, in closing the discussion, said that the longest case that he has is four years since time of operation, and I would not care to consider a case cured until it had passed through the first winter. The observation made by the gentleman who spoke of the West operation (Dr. Lutz) corresponds exactly with my own observation in cases in which I made the opening in the middle meatus. That opening is bound to close and the symptoms return. The disease condition may not be in the lachrymal duct; it may be at the neck of the sac or down at the nasal orifice, and unless these conditions are removed the normal drainage is not restored, and the epiphora remains. As to the pain. Patients can be given a dose of morphine before the operation. I use as a spray in the nose 20% cocaine with adrenalin. It is necessary to apply the cocoaine to the under surface of the turbinate, and

it is best to inject a solution up into the canal. It is rather difficult to find the orifice under the lower turbine, but if you have the parts thoroughly anesthetized you can see the opening in about one-half the cases; even then, it is not easy to get an instrument up into the canal from below unless you break away the lower turbinate, or remove it. After removal of the lower end of the turbinate bone you can lift up the outer layer of mucous membrane and see the orifice directly, and get your cocaine up into the canal. Of course in cases of epiphora without abscess, you can inject cocacin from above, but if you are dealing with a collection of mucus or pus in the sac there is always a complete obstruction and you cannot inject from above. By the use of morphine, or morphine and acopolamin, and thorough cocainization it is possible to make the operation practically painless, but it is still disagreeable on account of the discomfort following the use of the chisel on the nose. Even if the cutting is painless the shock and jar are always disagreeable. I should say that the operation can be done with as little pain as a submucous resection, and, incidentally, it requires little more skill. When the latter first became popular men took an hour and a half to it, but now an experienced man can do it in fifteen minutes. In regard to how you would recognize the lumen of the lacrymal canal when strictured. When you start to slit the canal from below you are looking on the periosteal surface; after the incision is begun, you see the edge of the mucous membrane surface and can distinguish it from the periosteal surface, and so follow up the lumen. I do this work with a set of scissors that I have found very useful in various work about the nose. One straight pair and two curved. (Demonstration on blackboard).

A REPORT OF THREE UNUSUAL CASES OF STAMMERING.

By G. HUDSON MAKUEN, M. D., Philadelphia, Pa.

Stammering is like many similar nervous affections or diseases in that it may be divided into three more or less distinct stages, the prodromal, the acute, and the chronic. The prodromal stage is found in early childhood, and it is characterized by rapid and blustering speech. The acute stage comes in later childhood, and it is characterized by a marked hesitation in speech which is usually unconscious although accompanied by varying degrees of spasmodic muscular contractions and contortions. The chronic stage follows hard upon the other two as the natural result of a continuance of the affection and it has all the symptoms of the other two in a somewhat aggravated form together with certain important mental and emotional complications which always accompany a full, conscious realization of the condition.

The prodromal stage is one from which many children pass without serious difficulty, especially when they have some intelligent help. The acute stage, is the forerunner of more serious trouble, and the chronic stage is the full development of the affection with all its varied complications.

Every case of stammering is unusual because no two are exactly alike, but some cases are more unusual than others. The three which I am about to report are alike in that they are all in the chronic stage, two of the men afflicted being forty years of age and having stammered for more than thirty-five years, and one of them being 32 years of age and having stammered ever since he can remember.

Case I. A physician forty years of age, has stammered for thirty-five years. His stammering varies in degree and it has increased in intensity. There is no history of hereditary influences nor was the patient associated as a child with any similarly afflicted. He had whooping cough at an early age, but it was not sufficiently severe to be a factor in his condition.

The patient is in good health and possessed of all his faculties. He is nervous and excitable, although he claims that this condition is a result rather than a cause of his stammering. He is of average mentality, has a good memory, is strongly initiative, and

does not appear to be lacking in attention although his powers of concentration and volition are unstable. His family history reveals nothing of a positive character, except that his mother died of tuberculosis. The patient himself is unable to recall any particular incident in his life that may suggest a cause for the beginning of his speech difficulties. There is no peculiarity about his writing. He stammers somewhat when he attempts to read aloud, he stammers very much in conversation, and he is quite unable to speak at all in public. The defect does not appear in singing.

He claims to have had no subjective nose, throat or ear trouble although the septum is markedly deflected toward the left nostril, causing considerable intranasal pressure and pharyngeal irritability, a condition by the way which I have found to be very common with stammerers. More than 90% of my cases have intranasal pressure with irritability of the pharynx.

The patient had taken a course of treatment in Philadelphia and had been twice to another school for stammerers, but he had received no benefit whatever. His conversational speech, when he was able to say any words at all, was drawling and painful to listen to, and it was accompanied by various motions of the hand and forearm, such as beating time and drawing figures of eight, which manœuvers he claimed made it possible at times for him to surmount his difficulties to some extent, and occasionally at least to converse with his friends because, as he said, they enabled him to forget his stammering and thus to banish the *fear* of it.

His own experience had led him to the belief that stammering is a "phobia" pure and simple and that there is no help for the affection except through the removal of fear. He was convinced also that all training of the organs of speech must be worse than useless, because it tends to fix the attention upon the difficulties and thus to increase the fear. He was sure that he could speak well if he could banish fear, but he was equally sure that there was no power on earth that could help him to do it.

He was in Philadelphia about two weeks, during which time I saw him nearly every day and tried to convince him of the error of his ways and the falsity of his theories, but I failed utterly because he was so disinclined to do the amount of work which would have been necessary in his case to enable him to acquire volitional control of his organs of speech, and thus prove to himself that there was no basis for his fear. It was of no avail

that I quoted Emerson where he says, "The antidote to fear is knowledge." The fear of stammering in my experience has always vanished when the patient has acquired a good working knowledge of the mechanisms of speech and a voluntary control of them through systematic and persistent practise.

This man, however, was in the unfortunate condition of mind, which is by no means uncommon in these cases, of being unable to make any persistent effort to do what seemed to him a great amount of work, because of his doubt or lack of confidence in the results to be acquired, and who can blame him? He had had three unfortunate experiences with other methods for a cure. He had given his money, his time, and a certain amount of energy to the work without receiving an adequate return, and his confidence was not only shaken but absolutely shattered. I could not persuade him to try again. It was in vain that I pointed out to him the difference between the methods which he had used and the one which I was advocating. I tried to show him that the former were merely tricks to divert his mind from the difficulties and thus enable him to overcome them, while the latter system, or the one which I would have him adopt, was along physiologic lines and consisted merely in an effort to supplant his defective speech with normal speech, built up on scientific principles. I was utterly unable to convince him that the end would in all probability justify the means, and he went away quite in the condition of the man who said that "it was happier to be miserable than to be happy without being miserable."

Case II. A man, also forty years of age, has stammered for thirty-six years. He is a clerk in a weather bureau, and he says his stammering is not increasing because it cannot be worse. It was of gradual development and it began spontaneously. When a child, he says, he was "saturated with the Bible," and he was once greatly disturbed by overhearing a conversation in which it was predicted that the world was soon coming to an end. He gives no history of relatives having stammered in their speech, but he says that his mother, who was also sensitive on the end of the world question, had something akin to stammering in her fingers while playing the piano. He has one younger sister who has no defective speech whatsoever. He had whooping cough and measles during infancy, and he suffered from some intestinal colic when very young. His memory is fairly good, but his powers of concentration are poor.

The patient's father developed epileptiform attacks late in life, which interfered with his speaking and writing during the last two years of his life, and he died in a sanitarium as a result of cerebral embolism.

The patient is exceedingly nervous and excitable, a condition which he thinks he inherits and which is largely responsible for his trouble. In 1884, he studied some months with a negro who had himself been cured, and thus he got some temporary relief. In 1890, he was in a school here in Philadelphia for the cure of stammering, and again in 1894. In November of 1911, he consulted Dr. Coriat, of Boston, who gave him some mental or psychic treatment, but he was unable to put him in the hypnotic state, or find any subconscious cause for his condition. The theory is now being advanced by certain neurologists or psychologists that stammering is due to a "forgotten reminiscence," such for instance, as this man's fright of early childhood with reference to the ending of the world, and that this forgotten reminiscence must be recalled or brought within the domain of consciousness before the stammerer can be permanently cured. Professor Munsterburg of Harvard was nearer the truth in the matter however when he said he had long since ceased to experiment with stammering, because the psychic method halts when it reaches the physical obstruction.

Case III. A clerk, aged 32, employed in a wholesale drug house, had stammered ever since he could remember. His father was an alcoholic and died in an insane asylum. When he was a baby, his father came home intoxicated one evening and upset the cradle, greatly frightening the child and everyone in the house.

The patient had none of the infectious diseases of childhood and there was no one else in the family who had been similarly afflicted. He was mentally alert and fairly bright, but inclined to be introspective, moody and at times even morose. He seemed to brood over his condition, but not as I thought, excessively or more than he could bear, and he began his treatment with us in a fairly satisfactory manner, making very good progress, indeed. His sister called upon us after two weeks had elapsed and expressed herself as greatly pleased. She said that he talked better and he was much less nervous. After about five weeks, however, he made a little visit home, and his uncle showed some disappointment and displeasure, because as he said, he seemed not to be entirely cured.

This greatly discouraged the patient and he came back to us in a very nervous and excited condition. My assistant, at whose home he was staying, said that she was anxious about him because he seemed at times not to be able to control himself or to do his work satisfactorily. He would draw his hand across his forehead and stare into vacancy in a somewhat excited manner, while all the time trying to do the things which were required of him. I myself had several interviews with him in which he seemed to be entirely rational, although it was with difficulty that I was able even temporarily to help him out of his condition of despondency. I made no attempt to hypnotize him, but I used every other psychic measure at my disposal to bring about a more cheerful and hopeful attitude with reference to his work. Just as I thought we were succeeding in our efforts, he suddenly and without giving warning or notice either to me or to his hostess, packed his bag and went home. He immediately wrote me to the effect that he had decided to give up the treatment for a while at least, to which I replied that perhaps he would feel like returning later; but in about a week, I received a letter from his mother stating that her son had been greatly disturbed because he had not been able to more speedily overcome his speech difficulties, and although she tried in every way to cheer him up, he absolutely refused to be comforted, and after eating his breakfast one morning, he left his home about 7.30 presumably to go to his place of business, but he went instead to Prospect Park and took his life with a revolver.

I mention this fact to show the awful mental suffering that sometimes attends this affection. I have had several patients tell me that self destruction seemed to them at times to be the only real way out of their difficulties. This feeling is always increased with each failure to overcome the stammering, and in as much as about 90% of those who attend the various institutions for the cure of the affection fail in reaching a solution of the problem of good speech, it is a question whether the schools for stammering on the whole may not be doing more harm than good.

Moreover, there is a common belief—and it seems to exist even in the medical profession—that children grow out of stammering, but this I think is a thing that never happens. It is true that the habit of stammering is often somewhat overcome in later life, but such improvement in speech is almost always the result of assistance from some source and great pains taking effort on the part of the individual. Children do not of themselves grow

out of the affection, but they grow into it and its awful consequences are well illustrated by the three cases which I have described.

DISCUSSION.

Dr. Chambers: There are several schemes for teaching the memory advertised in the papers and they are all based on the wrong idea. Loisette gives you some nails to hang facts on. I took the lessons and I could name all the presidents and give dates, and learned the greatest lot of stuff, but of course I have forgotten it all now. The greatest fakirs are the singing teachers and the schools for stammering. The true idea is to develop the gray matter itself. Take a verse from the Bible and repeat and repeat it until the gray matter has it and then you cannot lose it.

Dr. Makuen's idea for the relief of the stammerer and stutterer, seems based on teaching the sufferer how he must help himself.

Dr. Makuen, (closing): There is no trick about the cure of stammering. It is purely educational. If any of you should happen to stammer you would not know how to avoid it because you do not know how you learned to speak. We all acquired speech automatically and unconsciously. The stammerer must be taught how to use his respiratory and phonatory muscles, and how to bring them under absolute volitional control. I do not regard stammering as being merely a defect of the speech centers. It is a defect of the whole mental and physical organism. To cure a man of stammering, you must cure him of a great many other things. It is a question of psychical development along physical lines, and the treatment should be undertaken in the first stage of the affection.

PNEUMOCOCCUS INFECTIONS OF THE NOSE AND THROAT.

By CLEMENT F. THEISEN, M. D., Albany, N. Y.

During the past fall and the present winter, some rather unusual cases of pneumococcus infections of the nose and throat have occurred in the writer's practice. Some of the cases were similar in many of their clinical aspects, to the cases occurring in the epidemics reported in Boston, New York and other places, last winter. The name "septic sore throat," was given to some of the cases reported last year.

Most of the cases observed by the writer ran the course of severe infectious conditions, with marked constitutional disturbances, and involvement of the kidneys. A more or less severe kidney disturbance is not very uncommon in throat infections, such as peritonsillar abscesses, follicular tonsillitis and other inflammatory conditions.

The following cases are characteristic of the type seen by the writer this winter:

Case 1. Child, aged 7 months, admitted to the Child's Hospital in December, 1912, for an apparently severe cold.

The child had a rather severe cough and a profuse nasal discharge of a stringy character. No pus could be detected in the discharge. The temperature was 102° F. on admission to the hospital, and almost immediately great difficulty in breathing developed. On account of the character of the nasal discharge, cultures were taken from the nose and throat.

On examination of the throat, the entire pharynx, including the tonsillar region, soft palate and uvula, was found to be extremely edematous and the mucous membrane was covered with the same stringy mucous. Because of the great edema, a satisfactory view of the larynx was not obtained. The glands on either side of the angle of the jaw were much swollen.

Two cultures from the throat were negative for Klebs-Loeffler bacilli, but contained pneumococci, and a swab taken from the nose alone, gave a pure culture of pneumococci. The difficulty in breathing for two nights was so extreme that we thought a tracheotomy would be necessary. There was undoubtedly a good

deal of edema in the larynx also. That was six weeks ago, and there has been no recurrence of the difficult breathing. The edema of the pharynx gradually subsided under the use of a cold antiseptic spray, containing some adrenalin. At no time was there any evidence of a collection of pus in the throat. The child is still in the hospital, and while the nasal discharge has stopped, there is still some fever, and a palpable spleen. The blood count did not show any marked leucocytosis.

The child received 1 gr. of urotropin in each ounce of fluid, for several weeks. Whether this modified the infection I do not know. Reports as to the value of urotropin in air passage infections are contradictory, but it certainly seems to do good in some cases. The writer has never seen hematuria follow the administration of urotropin, although cases have been reported after only 30 or 40 grs.

Case 2. The next case is that of Mrs. H., aged 66 years old, who said she had never had a sore throat until the one for which the writer was consulted developed. For years, from time to time, I have had occasion to treat her for an O. M. C. C. She has small submerged tonsils which had never given her trouble before. The attack started with a sharp chill and headache. There was severe dysphagia from the beginning of the attack.

Ordinary remedies were used for 24 hours, and when the writer was sent for, the patient was sitting in a chair with labored stertorous breathing.

The throat presented almost the same appearance as in the other case, i. e., great edema of the tonsils, soft palate, uvula, in fact the throat looked like an inflated bladder.

Calomel was given at once, and after incisions through the edematous parts, a culture was taken which showed a mixed pneumococcus and staphylococcus infection with the pneumococci greatly predominating. Albumen and granular and hyalin casts were found in the urine. Blood count showed a leucocytosis of 12000. Ice packs were used around the neck, with ice in the mouth. An iced spray was used at short intervals and urotropin was given, about 40 grs. daily being used, each tablet being dissolved in a large glass of water. Diet was limited to milk.

The edema of the pharynx persisted for a week in spite of repeated incisions and local treatment. At no time was there any pus found. The throat gradually cleared up but albumen persisted in the urine for some time. It is interesting that in

this case the anterior surface of the epiglottis was also decidedly edematous, like the condition described by Michel in 1878, to which he gave the name, "Angina Epiglottidea Anterior." (Michel. Centralblatt fur Medicinische Wissenschaften, No. 2, 1878).

The writer also in the Albany Medical Annals, July, 1900, reported a series of cases in which the edema and inflammation of the anterior surface of the epiglottis occurred as a primary infection, without involvement of the pharynx.

In this series of cases which also ran the course of severe acute infectious conditions, cultures showed mixed pneumococcus, staphylococcus and streptococcus infections with the pneumococcus predominating.

Case *3*. The third case which the writer would like to report, was similar to the last one, occurring in a man, aged 45 years, who had been subject to sore throat at times. This attack also started with a chill, headache and a sharp elevation of temperature 104° F. The throat presented almost identically the same appearance as in the second case, except that the epiglottis was not involved. The great edema again persisted for a week in spite of scarification and energetic local treatment. Albumen and casts were present in the urine, the spleen was enlarged and in fact all the symptoms of a severe infection were present. Urotropin in large doses and in large quantities of water was given, and appeared to cut the attack short. Cultures in this case again showed almost a pure pneumococcus infection. The infection was so severe that Mulford's anti-pneumococcic serum was used, but without apparent effect. This case ran the same course as the second one, the throat slowly clearing up. Fairly high temperatures persisted for two weeks and there was great prostration. No pus could be found in the throat at any time.

Cases 4 and 5. Two cases, both young adults, were seen, with great inflammation and edema of the anterior surface of the epiglottis. The pharynx in both cases with the exception of a slight redness, was normal. In both cases there was considerable difficulty in breathing, and great pain in swallowing, in fact, for several days they were practically unable to swallow.

Cultures from both throats, after incisions, showed pneumococcus infections with few other organisms.

These cases are of considerable interest, because they prove, contrary to Semon's opinion, who claimed that "many of the

forms of acute septic inflammation of the throat, that have been classified in the past as separate conditions, have a pathological identity," that an acute edema of the anterior surface of the epiglottis may occur as a primary condition. (Seamon. British Medical Journal, April 27, and May 18, 1895).

An interesting case of this kind has been reported by Crisp. (Transactions of the Pathological Society, London. Vol. 17, p. 28, 1866). In his case, that of a boy eight years old, death occurred suddenly, apparently by suffocation, after he had been ill three or four days. The autopsy revealed a swelling of the epiglottis with no lesion in any other part.

Another interesting case has been reported by Fredet (Epiglottide suppuree avec oedeme dela glotte. Mort par. asphyxie. Soc. de med. leg. de France. Vol. 7, p. 91, 1882).

In this case, that of a young man of twenty years, great difficulty in breathing came on suddenly after a debauch. Suffocation rapidly ensued, and at the autopsy great edema of the epiglottis was found. When this was incised, a large amount of pus was evacuated.

The facts, that in the two cases of this kind, and in the three other cases reported by the writer in this paper, in all of which there was great edema associated with the symptoms of an acute infectious condition, and that they were all practically pure pneumococcus infections, are of some interest.

It is known, that the pneumococcus, when some of the lower animals are inoculated with it, will sometimes produce local edema.

Welch, (Johns Hopkins Hospital Bulletin, December, 1892, p. 135) in his interesting article on the "micrococcus lanceolatus," has brought this out. He quotes Foa, who distinguished a special variety of this organism. His pneumococcus he called diplococcus lanceolatus of the edematogenic variety. This edematogenic variety of the pneumococcus often produces, after subcutaneous inoculation into the subcutaneous tissue of some of the lower animals, widely spreading or local edema. Welch has also obtained cultures, which when injected subcutaneously produced uniformly extensive local subcutaneous edema.

Another point of interest in this series of cases, is the absence of suppuration. In none of the cases was pus found when incisions were made.

NASAL HEMORRHAGE FOLLOWING TURBINECTOMY IN A HEMOPHILIAC TREATED BY THE INJECTION OF HUMAN BLOOD SERUM.

By LINN EMERSON, M. D., Orange, N. J.

The use of human or other blood serums in cases of hemophilia is proving to be a measure of value. In the Journal of the American Medical Association of October 26th, 1912, four cases are reported by different authors in which the measure was apparently successful in three.

One of our members, Dr. Theisen, has also reported several cases. Dr. J. H. Bradshaw of Orange reported to the Orange Memorial Hospital Medical Society in September a case of hemophilia in the new born saved by the use of human serum and described the apparatus used by Welch and himself to secure the blood for the serum.

Mr. J. C., aged 31, a vigorous healthy married man, consulted me on September 28th, 1912, for chronic catarrhal deafness. To improve hearing and facilitate the passage of the eustachian catheter, I removed the major portion of the left inferior turbinate on the morning of October 6th. As he bled rather freely and continued to ooze even after packing with Simpson tampons of Bernay sponge, I advised him to remain in my office during the afternoon, as I was called out of town to perform several adenoid operations.

I had just begun my second adenoid operation, when I received a call from his family physician who was with him in my office, and who seemed to think the case needed my immediate attention. As I was more than 20 miles distant and had four other adenoid operations scheduled, all of whom had been starved and prepared, I could not see the feasibility of an immediate return, but advised him to either pack the patient himself or get some other rhinologist. This he was unable to do, it being late Sunday afternoon and no other specialist being available.

I suggested serum injection, and the patient was given 2000 units of diphtheria antitoxin. On my return, at 8:20 p. m., this was repeated, and the bleeding being persistent, I removed the tampons and packed tightly with a cotton tampon behind and gauze saturated with adrenalin in front. Even after this pack-

ing the blood oozed steadily from the front, and one or two ounces were lost during the night.

A special nurse was secured, and the patient remained in bed in my offices and I also slept there that night. About noon the following day, the hemorrhage being nearly stopped, he was taken to the Orange Memorial Hospital in an ambulance.

The slightest movement or lying down would cause the oozing to start afresh from the front, so the patient sat up in bed for more than a week after his operation.

On the fourth day, after he was plugged, I removed the posterior plug without mishap, but he was so fearful that the removal of the gauze would cause renewed bleeding, that he was permitted to pull it out himself and cut it off an inch at a time. Ten days elapsed before the gauze all came away and the day following he was allowed to go home. Despite the fact that he remained very quiet most of the time in bed, bleeding recurred on the 20th, two weeks from the day of the operation, and after three days of milder methods of treatment, I was obliged to plug him tightly again at 3 a. m. on the 23rd. On this same day the patient's brother was brought from a distance and I called Dr. Bradshaw to get blood from him for the serum. The apparatus did not work satisfactorily, and most of the blood was collected by spontaneous flow from the median basilic vein.

The serum was separated by clotting and gravity and about seven ounces were secured. The first two days 20 cc were injected subcutaneously three times a day, and the effect immediately following the injection was marked. After two days the frequency of the injection was lessened, and when reduced to once daily the bleeding recurred, but to a much lesser degree. The patient's physical and mental condition were becoming alarming so it was decided to secure more serum.

A healthy man was secured, and on October 30th, I bled him from the median basilic vein collecting the blood in a wide mouthed dressing jar, when the blood spurted it was deflected into the jar by the cover held by a nurse. More than a quart of blood was secured and about nine ounces of serum was obtained. This was used as before and after using 20 cc three times a day for three days, the packing was finally completely removed on November 2nd. The injection was continued once daily for nearly a week after this.

The patient has very slowly and gradually regained his health and strength, but has been very apprehensive of a return of the

hemorrhage. As late as February 1st, he came to me greatly worried because the mucus from his nostril is occasionally slightly tinged with blood.

His early history secured by careful questioning after the operation is interesting. He once had a tooth extracted and bled for three days afterward, but does not seem to have lost any very great amount of blood.

While a college student, his leg was bruised while playing football, and a large swelling developed, which "laid him up" for nearly a year. Several physicians were much puzzled at this condition, which was no doubt an intramuscular hemorrhage.

He had 7½ grains of calcium chlorid three times a day and gelatin dessert with his meals for a week before operation. This was also kept up for a number of weeks, during his convalescence.

It is interesting to note, that about a pint of serum, more than half of which came from a donor unrelated by blood, gave rise to no unfavorable symptoms of any sort.

DISCUSSION.

Dr. Wilson: In answer to Dr. Emerson's question as to whether thrombo-kinase has been employed in hemophilia, I would say that at the last meeting of the Section on Otology Dr. Lederman had removed a polypus from the ear, with intense bleeding, and used thrombo-kinase without avail.

Dr. Wilson: I think it has been set down in most text-books that the female child is not a hemophiliac, but recently I have seen several cases reported where young girls have been hemophiliacs, so we must be just as cautious in operating upon the female as upon the male. It has been suggested many times that in all our operations we take the time of clotting before operating, and if it exceeds 10 minutes try to postpone the operation. I am using the Biffi-Brooks Coagulometer and find it very satisfactory.

Dr. Kopetzky: I am glad to give whatever evidence I can regarding the use of thrombo-kinase. We have used it in all kinds of operations and it does seem to possess distinct value and cause rapid clotting. But in a case such as was described by Dr. Emerson, it would naturally be washed away with the free flow of the blood. It has been tried in cases of hemophilia with success. It is prepared by Dr. W. L. Strong, pathologist at the Woman's Hospital, formerly at the Manhattan Eye, Ear and Throat Hospital, New York City.

Answering the question as to what thrombo-kinase was, Dr. Kopetzky said that it is prepared from the lungs of the sheep, and consisted in an acid insoluable albumen, and probably some unknown enzyme or ferment.

Dr. Yankauer: I remember two or three cases of severe nose-bleed from the lower turbinate. One in particular, after the use of allipin. In one I did not get anesthesia, but had tremendous secondary hemorrhage. I packed this case very tight, but could not stop the bleeding. Finally I took all the packing out and had him snuff up some ice water, which stopped the bleeding. I have had it happen in other cases that when the packing was removed the bleeding

stopped without much trouble. This is because the nose is a bony cavity and the veins that leave the nose in front all pass through bony openings, whereas the veins that leave it in the back pass through mucous membrane and wider openings. If you pack the back of the nose and obstruct the veins there the excess of blood cannot pass out of the veins in the front. The only part that you can pack without increasing hemorrhage is the front. If you pack the back tight the front will bleed. If you pack the back of the nose tightly you can often see the mucous membrane in the anterior part of the nose swelling up and becoming blue. So it is advisable never to pack the posterior part of the nose tightly, and I have found in a number of cases with hemorrhage, in spite of the packing, that when the packing was removed and cold water or adrenalin spray applied, the bleeding stopped spontaneously.

Dr. Yankauer: There is a substance made from sheep's blood that we have used in Dr. Mayer's clinic after various operations with success. It is called thrombo-kinase, and is prepared by Dr. W. L. Strong. Applicators are moistened and dipped into the powder and applied to the wounded surface. It forms a firm, strong clot around the wound, so as to prevent the possibility of hemorrhage. It is also prepared at the Mount Sinai Hospital, New York.

Dr. Emerson, in closing the discussion, said: Of course in my mind there is no doubt that this was a case of true hemophilia. As to Dr. Stout's question why I did not use horse serum, it was because I discussed the question with several men and decided against it, fearing anaphylaxis. The reason why I did not use thrombo-kinase was because the flow of blood was so furious it would have been washed away. Before I packed him the second time I tried mild packing and no packing for three days before I put in a posterior plug tightly, and he would put a piece of cotton on his lip and that cotton would become one big black hard mass half as big as your fist. The blood would stand as a thin watery serum for 12 hours without any sign of clot. The first time I packed him after 24 hours, leaving the posterior plug in four days. Whenever he removed the gauze he would bleed furiously. He begged to be allowed to remove the gauze slowly himself, and consumed 10 days getting it out. He would draw out a small portion and snip it off. He went home on Thursday and his hemorrhage recurred on Saturday. I was away and he bled several hours before I could reach him. No preservative was used to keep the blood which was kept on ice for about one week, using no precautions excepting a sterile jar, and after it was set it was poured off into one-ounce stopper bottles, and about 5 drams used t. i. d. with a solid metal syringe. The skin was painted with tincture of iodin in preparation. I thought the man was going to die, as did also his family and the family physician. The effect of the human blood serum was immediate. The first injections consisted of 5 drams three times daily; then we thought we would make it last longer, so we dropped down to twice a day and then once a day. Then he began to ooze again. His brother had been bled, and as no other member of the family was available we had to obtain another man. After his packing was out and the bleeding did not recur we gave him one injection a day. He still comes back to me every week because he does not dare to blow his nose. There is not much abrasion of the mucous membrane. He looks like a healthy man that has had about one-half the inferior turbinate removed. It was taken off to improve his breathing and facilitate the passage of the eustachian catheter. We discussed submucous resection, and we decided he would get free enough breathing by taking off part of the turbinate instead of doing the more extensive operation of resection.

SEVERAL CASES IN LARYNGOLOGICAL PRACTICE.

By JOHN F. CULP, M. D., Harrisburg, Pa.

I should like to call your attention this afternoon, to several rather unusual cases occurring in my laryngological practice. Some of the symptoms of these patients are to me, at least, rather unusual, and it seems, justify their presentation here. It is to be hoped that the discussion, of which they form the basis, will be of more value than the paper itself.

Patient No. 1. Colored woman—mulatto, aged thirty years, came to Dispensary of Harrisburg Hospital, March, 1911, complaining of a tumor on the right side of her neck, which at times bothered her a good deal. She gave the following rather unusual history: About three years before coming to the hospital she noticed a small, soft, movable tumor on the right side of the neck below the hyoid bone. Some time after noticing this tumor, she had tonsillitis, the right tonsil being especially sore. The tumor became larger after this attack.

During the next two years the tonsillitis recurred quite a number of times, and in the meanwhile, the tumor was gradually increasing in size. One night after an especially severe attack of sore throat, she was awakened by a severe choking and a sense of suffocation. At this time she coughed up many mouthsful of a milky fluid mixed with blood, and the next morning she was surprised to find that the tumor had completely disappeared.

During the next year she had six or eight similar experiences, each of which was more severe than the former. First tonsillitis —always worse on right side—then reappearance and increase of swelling on right side of neck. About ten days after the attacks, the the tumor reappeared, followed by suffocation, and cough usually at night and the disappearance of the tumor only to return after the next attack of sore throat. Her general health had suffered. She had become thin, weak, nervous and apprehensive. Examination of neck showed a soft tumor the size of a big hen's egg. This mass was on the right side below the hyoid, and extended apparently to the lower edge of the thyroid cartilage and moved with the larynx in swallowing. The larynx appeared normal. The pharynx was also normal save for the right tonsil,

which was small, submerged, diseased and fistulous. A probe introduced at the base of the tonsil could be easily pushed for an inch towards the tumor mass. A diagnosis of cyst of the thyro-hyoid bursa was made.

The patient took the ether badly, and although the outer part of sac was easily dissected loose, the mass ruptured and fluid similar to skim milk with flocculent material escaped. A small fistula just above the rim of the thyroid cartilage was found. Through this a fine probe could be passed into the larynx through the thyro-hyoid membrane. The lining of the cyst wall was smooth. It was impossible to remove that portion, however, which was attached to the wing of the thyroid cartilage, and the thyro-hyoid membrane. During the whole operation, the patient was troubled with a most annoying laryngeal spasm. This spasm was probably more due to irritation of the internal laryngeal nerve, which is the sensory nerve of the larynx, rather than to escape of the cyst contents into the respiratory passage. The sinus was cauterized with pure carbolic acid, and the incision closed, except at the lower part where a small gauze drain was inserted. In three weeks the wound healed, and her health and strength rapidly returned.

It is a matter of regret, that no microscopic or bacteriologic examination was made of the cyst contents.

While cysts of this character are uncommon, yet they do occur. Keen in his System of Surgery says:

"The occurrence of hydrops or distention of one of the natural bursae of the neck gives rise to cysts so similar to those already mentioned that their diagnosis is often difficult or impossible except by aspiration and microscopic examination. These bursae exist normally between the hyoid bone and thyro-hyoid ligament, in front of the larynx and above the hyoid bone. They may become distended as a result of traumatism or of constitutional disease, rheumatism, pyemia, etc. The location of such cysts makes them liable to be mistaken for bronchial cysts, aberrant thyroids, thyroglossal ducts, etc.

"The ideal treatment of extirpation, as in bursae in general, often is not easily carried out. The cysts, if simple and movable, should be extirpated entire. When this is not practicable, drainage, tamponade, and iodin injections will bring about a slower cure."

The one unusual and dangerous condition in this case was the communication between this cyst and the upper larynx. The

cyst contents were always discharged while the patient was sleeping, and always gave rise to choking and suffocation. Just what pathological factors caused the formation of this sinus and just how an attack of tonsillitis could reinfect and cause the fluid to reform, is to me a mystery. There was no evidence of either tuberculosis or syphillis in this patient. The history of the case shows that the tumor for the first two years of its existence was a simple benign cyst, and it was not until after the original rupture of the sac that repeated reinfections and reformations occurred.

The next two cases are those of foreign bodies—one in the esophagus—one in the trachea.

Five years ago a young man subject of epilepsy had a fit on the street. When he came to himself he missed an upper plate of false teeth on which were fastened three teeth. His physician, who was consulted, sent him to me twenty-four hours later. As he had eaten a fair breakfast that morning, and there was nothing to be seen by inspection of the throat and he had no special distress, he was sent away with the positive assurance that he had not swallowed the teeth.

He returned the fourth day after the fit, and said that he was unable to swallow. An X-ray photograph showed the teeth lodged in the esophagus behind the cricoid. Assisted by a general surgeon, Dr. Kunkel, a lateral esophagotomy was done and the teeth extracted. Profiting by a former mistake three layers of deep sutures were used in closing the wound. He drank liquids the third day, and in ten days was discharged cured. In this case the mistake was made in not having an X-ray plate made at once. A more modern and probably less dangerous removal could have been effected by the esophagoscope. To one unfamiliar or only moderately expert with the use of this instrument it seems to me that esophagotomy was the operation of election.

Foreign Body in Trachea.

April, 1912. A little flaxen haired girl, three years old, was brought to the Harrisburg Hospital one Sunday evening. Three days before, while eating some soft home-made sausage, she had a choking fit, which the father said "almost finished her." A country physician was called in, who sent the little patient twenty-five miles across the country to my friend, Dr. Becker of Sunbury, who in turn referred her to me.

I did not see the child until the next noon, fully four days after the accident. Her breathing was so bad, and her general condition so extreme it seemed that she could live but a few minutes. Temperature 103, pulse could not be counted, skin cyanotic, large rales all over the chest.

A low tracheotomy was immediately done, with the hope of finding macerated sausage. Much to my surprise a large grain of yellow corn, much swollen, was found bobbing up and down in the trachea. After removing the corn the little patient was turned on her side to permit some of the mucous to run out of the tracheal opening. The wound was immediately closed, and the patient made an uneventful recovery.

The history in this case was misleading, though no doubt the distracted father tried to tell the truth.

Tracheotomy was indicated and the later results were just as good as bronchoscopy, and the operation itself was easier to do. It is doubtful if an X-ray picture would have shown anything, but it was a mistake not to have had such an examination. This case shows the unreliability at times of even the most positive history. It would seem that the immediate closing up of the tracheal wound averted the danger of a subsequent pneumonia.

DISCUSSION.

Dr. Wilson: I wish to congratulate the doctor on his success. The case reminds me of a similar one. A young woman came to my service, having swallowed a portion of her plate. I saw the plate through the screen and sent the case to Dr. Yankauer's associate, Dr. Ernest Meyer, who made an examination and could not find it. They made an X-ray plate, however, and located it, and he made several attempts to get it out, finally resorting to esophagotomy.

Dr. Emerson: I saw the case of a man who came into King's County Hospital with a history of having swallowed a chicken bone. It was a good many years ago, when X-ray work was not developed. The esophageal bougie was passed and the obstruction found. He was put to bed to wait for the laryngologist to come to see him. Suddenly he sat up and spat about a quart of blood, dying almost instantly. A large thigh-bone of a chicken was found to have perforated the esophagus and aorta.

Dr. Yankauer: I think Dr. Culp is to be congratulated upon his results, especially the esophagotomy. I myself have not had to do with esophagotomy, but have seen a number of such operations performed by general surgeons and the mortality has been very high, most of the cases dying, and the statement made by Dr. Jackson today is strictly true, that the esophagus is not a tolerant organ. The swollen grain of corn is interesting because of the misleading history, and is much like the case I reported earlier in the day, where the patient misled us as to the nature of the foreign body. I remember a case of foreign body somewhere in the bronchi in which I was told

that it was an L-shaped piece of brass. The laryngologist said he had seen a duplicate of the foreign body and the X-ray picture. I saw neither, but I passed the bronchoscope through the larynx without finding the body.

Tracheotomy was done and then the foreign body was easily seen and removed, proving to be a perfectly flat piece of brass. The boy had bitten it and flattened it out, so the bronchoscope passed right by it. I have come to the conclusion that we cannot take anyone's word as to what a foreign body looks like. I remember another case in which I removed a chicken-bone from the bronchial cavity. This patient was in the hospital and a diagnosis of bronchiectasis was made. The shadow of the cavity was clear enough, and I was permitted to make a bronchoscopic examination because I wished to see what a bronchiectatic cavity looked like. I saw a foreign body, which proved to be the cervical vertebra of a chicken. After its removal it was shown to the patient, who absolutely denied having swallowed it. So the history in these cases is very often entirely unreliable. It is a pity that this grain of corn was not removed with the bronchoscope, because I am sure it would have been a very easy case for bronchoscopy.

Dr. Culp, in closing the discussion, said: I am much disappointed that you did not give me some solution of the first case of the sinus in the upper part of the trachea, which formed and re-formed over a period of one year. I have not been able to find anything like it in history. In regard to the external opening of the esophagus, I have had three cases for the removal of coins from the esophagus in small children, including this case that I reported today. They all recovered, but the other two cases had been subjected to very rude manipulation before coming to me. It was a wonder they did not die before coming into my hands. They finally got well, but in each case there was a little fistulous opening in the side of the neck which persisted for about two months in one case. They are all well today. I realize that in these days it is probably not the operation of election, but to one who is not familiar with the use of the esophagoscope and bronchoscope, and is more or less familiar with the knife, it seems to me to be the best treatment for these cases.

MEETING OF THE MIDDLE SECTION, HELD IN ST. LOUIS, MISSOURI, FEBRUARY 22, 1913, UNDER THE CHAIRMANSHIP OF DR. WILLIAM E. SAUER, OF ST. LOUIS.

REMOVAL OF ADENOIDS BY DIRECT INSPECTION.

By JOSEPH C. BECK, M. D., Chicago, Ill.

After developing this method of operation for more than a year, I wish to present a brief and concise description, in order to place it on record, hoping that this procedure will so appeal to the operators who are engaged in this field of work that they will give it a trial.

It has always seemed to the writer that the removal of the adenoids, which is such an important operation to the well being of the individual, and so essential for the laryngologist to master, has been performed in an uncertain and unsatisfactory manner. Not that the operation as performed by the majority of men is not followed by good results, but that in a fair percentage of cases, even when performed by the expert, it is followed by what is regarded as recurrences or remains. Especially is this true of that group of adenoid vegetations in the region of the eustachian tubes. The one great difficulty is the inability to see clearly this important region during the operation. While operating for the removal of an epipharyngeal fibroma on a patient who had a short time before had his tonsils removed, I discovered what a large field of the postnasal space was exposed by the method I am about to describe, and it was at that moment that I made up my mind to apply it as a routine in adenectomy.

Dr. E. Pynchon, of Chicago, some four years ago demonstrated to me the retraction of the soft palate by means of rubber tubing, for the purpose of doing my operation of obliteration of the pharyngeal end of the eustachian tube in connection with the cure of chronic suppuration of the middle ear (Patulous tube after radical mastoid). I was not able to bring the ostium into very clear view, but I was enabled to employ a large laryngeal mirror and do the work very easily by the indirect method.

(Fig. 6.) The great difference of exposure of this region after the tonsils (tonsillectomy) are removed is apparent from the comparison of the two illustrations. (Fig. 5 and Fig. 3.)

The technic of the operation is as follows: Pass the free ends of a rubber urethral catheter (the smaller sizes), one through

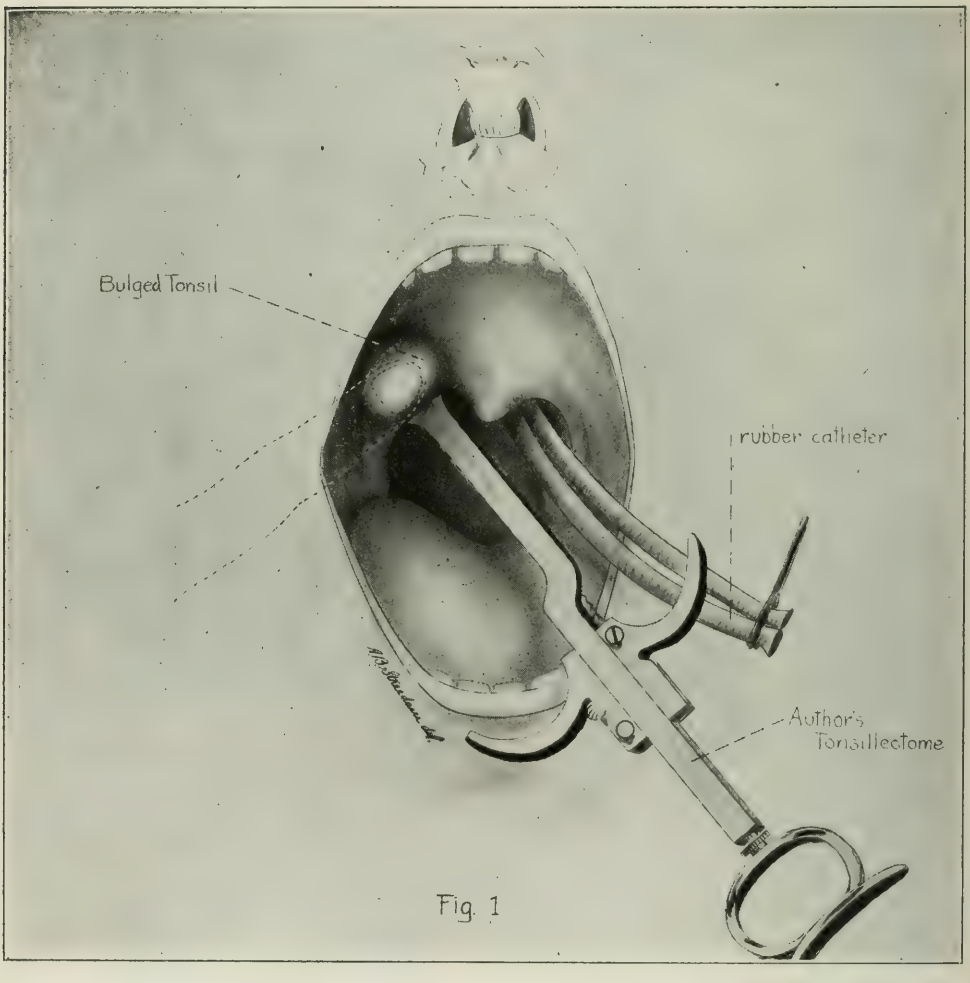


Fig. 1

either nostril, and withdraw them from the mouth, thus crossing the columella of the septum. Put a gauze sponge at this point to prevent too much pressure on the columella. Allow them to remain in this position while the tonsils are being removed, usually placing them to one side or the other out of the field of

operation of the tonsillectomy. As soon as one tonsil is out, the end of the catheter corresponding to the side from which the tonsil was removed is drawn taut out of the mouth and over the cheek, while the other end is held. This will bring the pressure from behind forward against the hard palate, and thus stop the

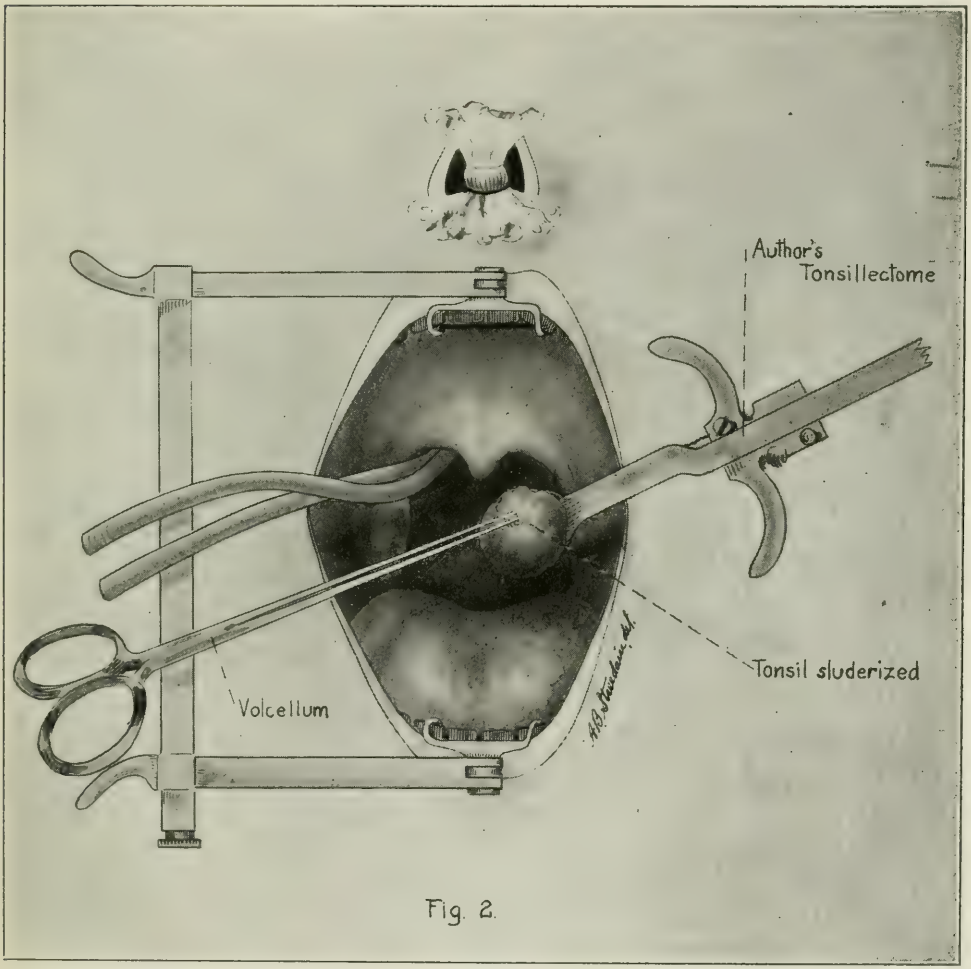


Fig. 2.

greater portion of the bleeding and enable one to do the opposite tonsillectomy with very little interference from bleeding of the tonsil removed. It will also bring the anterior and posterior pillars in apposition, thus closing in the large cavity created by the tonsillectomy. If the bleeding is profuse, place a small gauze

sponge between the two pillars and then by a fine rat-tooth forceps (Tuffier) hold them together, also taking in a small bit of the gauze so that it cannot fall out at the bottom. (Fig. 3.)

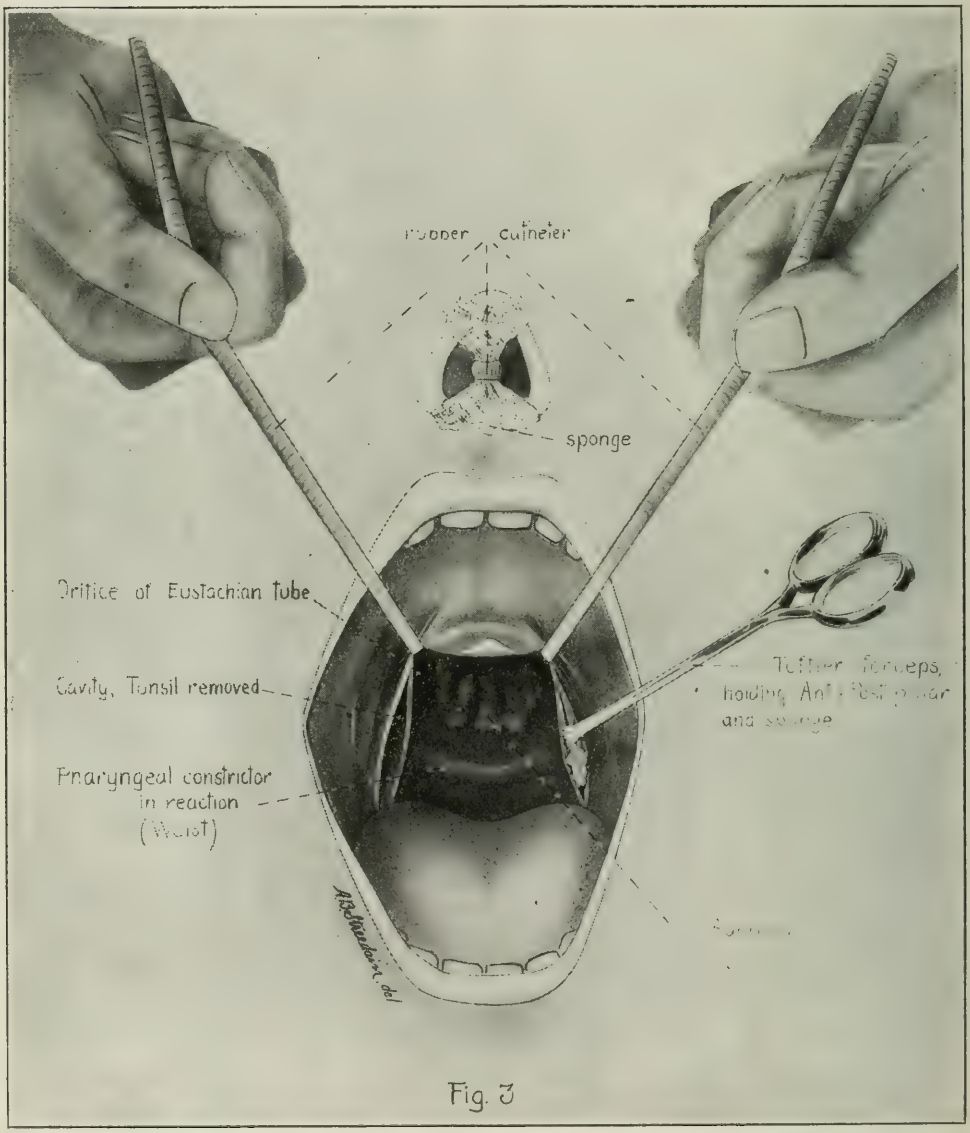


Fig. 3

When both tonsils are excised and the bleeding perfectly controlled, the soft palate is allowed to recede, the two pillars lib-

erated by the removal of the Tuffier forceps and the gauze sponge removed. The assistant then pulls both free ends of the catheter out over the cheeks, causing large exposure. (Fig. 3.) The head

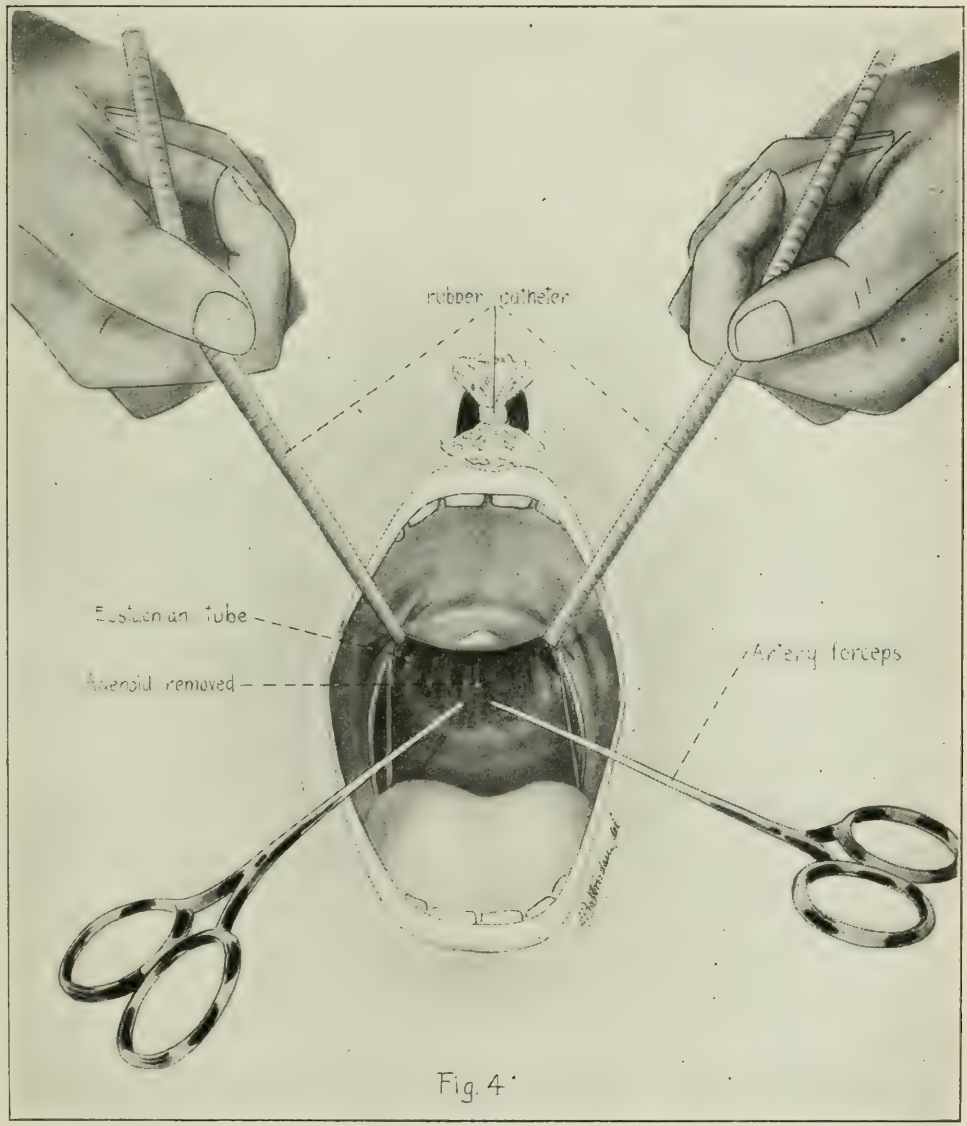
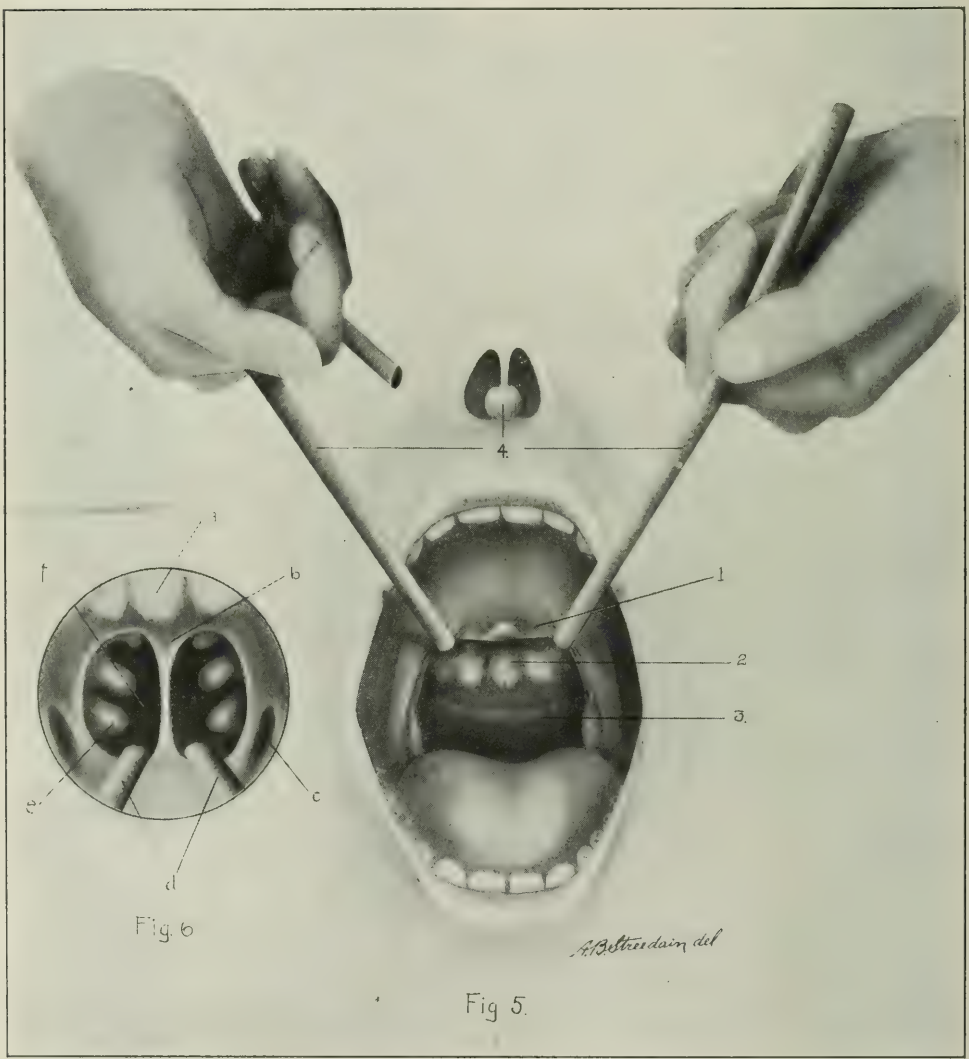


Fig. 4.

is now extended, and the region of the ostia, as well as the highest point of the vault of the pharynx, is seen. One must not

look from the side to get the best view of the tubal ends, but straight towards the vault. With a large laryngeal mirror inspection is made of the posterior nares with the entire nasal



contents, and the overriding of the adenoid mass into the posterior choanæ is noted. (Fig. 6.)

The mass is now palpated so as to determine the consistency and the amount of overriding. If the patient is not completely

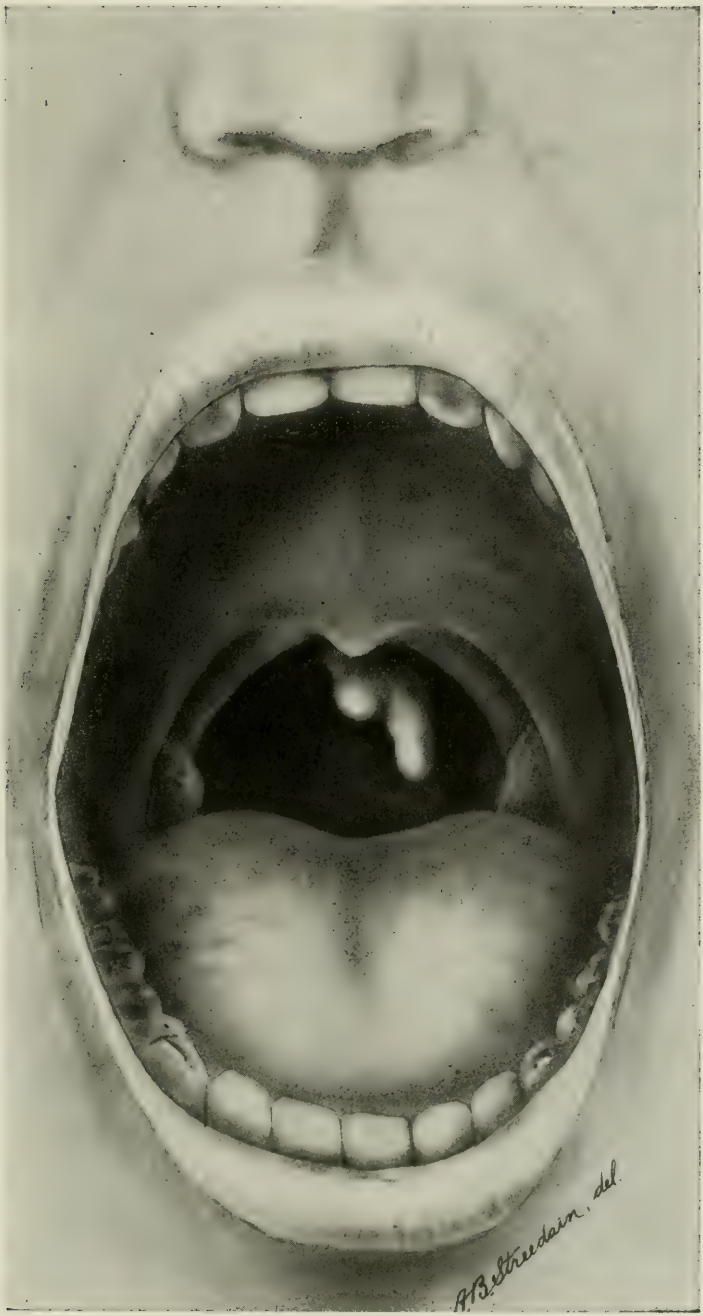


Fig. 7.

anesthetized, or his pharyngeal reflex not yet completely abolished, the examining finger gains the same impression as when examining the postnasal space of a conscious patient, namely: the constrictor muscle fold (Wulst) many times in the form of an incomplete ring. As long as that fold forms, the removal of the adenoids should be deferred and the patient completely anesthetized, because this muscle fold may be cut and produce symptoms of stiffness of the neck to which Fein recently called attention, but did not explain on this basis.

The removal of the adenoid mass itself may be done by any method preferred by the operator; but the removal of the remain-

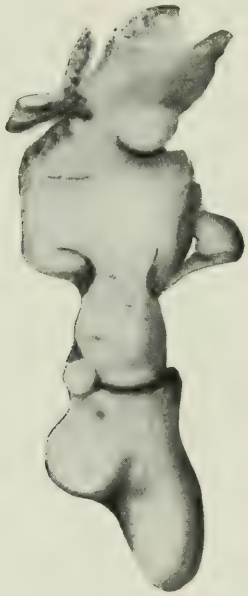


Fig. 8.

ing portions, especially in Rosenmüller's fossa, should be performed with a straight ring curette, such as it is customary to employ in the curettage of the endometrium. It may be bent to suit any particular shape desired. The pronounced oozing that results from the removal of the central mass is controlled by a gauze sponge mounted on a six-inch artery forceps, by exerting firm pressure for a few moments. This is particularly easy of execution, as the soft palate is drawn out of the way. If after removal of this sponge pressure the oozing does not cease, it may be checked by putting on from one to six artery forceps, grasping a small amount of the underlying soft fibrous tissue that is

always present after the removal of the adenoids. (Fig. 4.) These are allowed to remain for a few minutes, or until the time the patient awakes from the anesthesia.

The instrument that I employ now for the removal of the main mass is an adenoid curette of the St. Clair-Thompson pattern, without a guard, and with the cutting edge formed into a wave blade. (Fig. 9.) The motion of the instrument in the removal

Fig. 9.

of the mass is not in the usual rapid, sweeping movement of the elbow-wrist turn, but is from side to side and slow elbow-wrist turn. The mass is cut off and remains lying practically in situ; however, the last cut at the lower margin of the mass may require the use of a forceps to hold it. Shredding of the mucous membrane is not possible under these circumstances, nor is it possible to cut off any of the muscle fibers of the constrictor fold, as I have seen in the operation when done by feeling alone.

There are two other points in the operation that are, in my opinion, important, namely: the method of administration of the anesthetic, and the employment of suction to remove secretion and blood. I employ ether exclusively after having tried gas-oxygen for some time, as I find that the latter does not completely relax the pharyngeal muscles, which is necessary for the performance of tonsillectomy and more so for adenectomy, as will be shown later. To induce the anesthesia we employ what

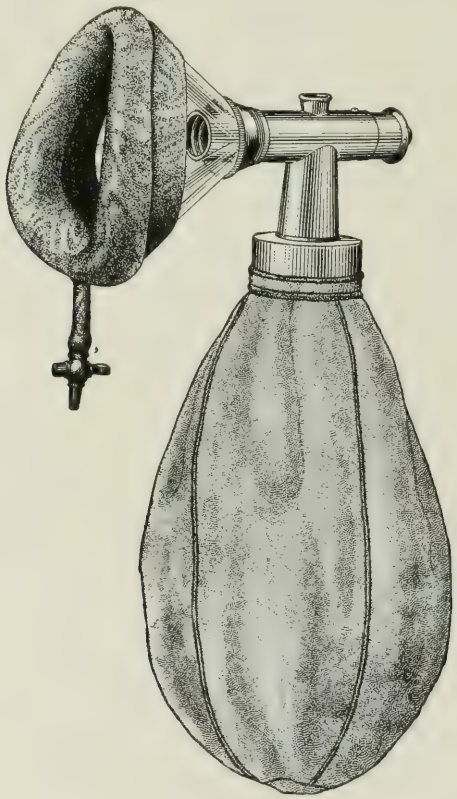
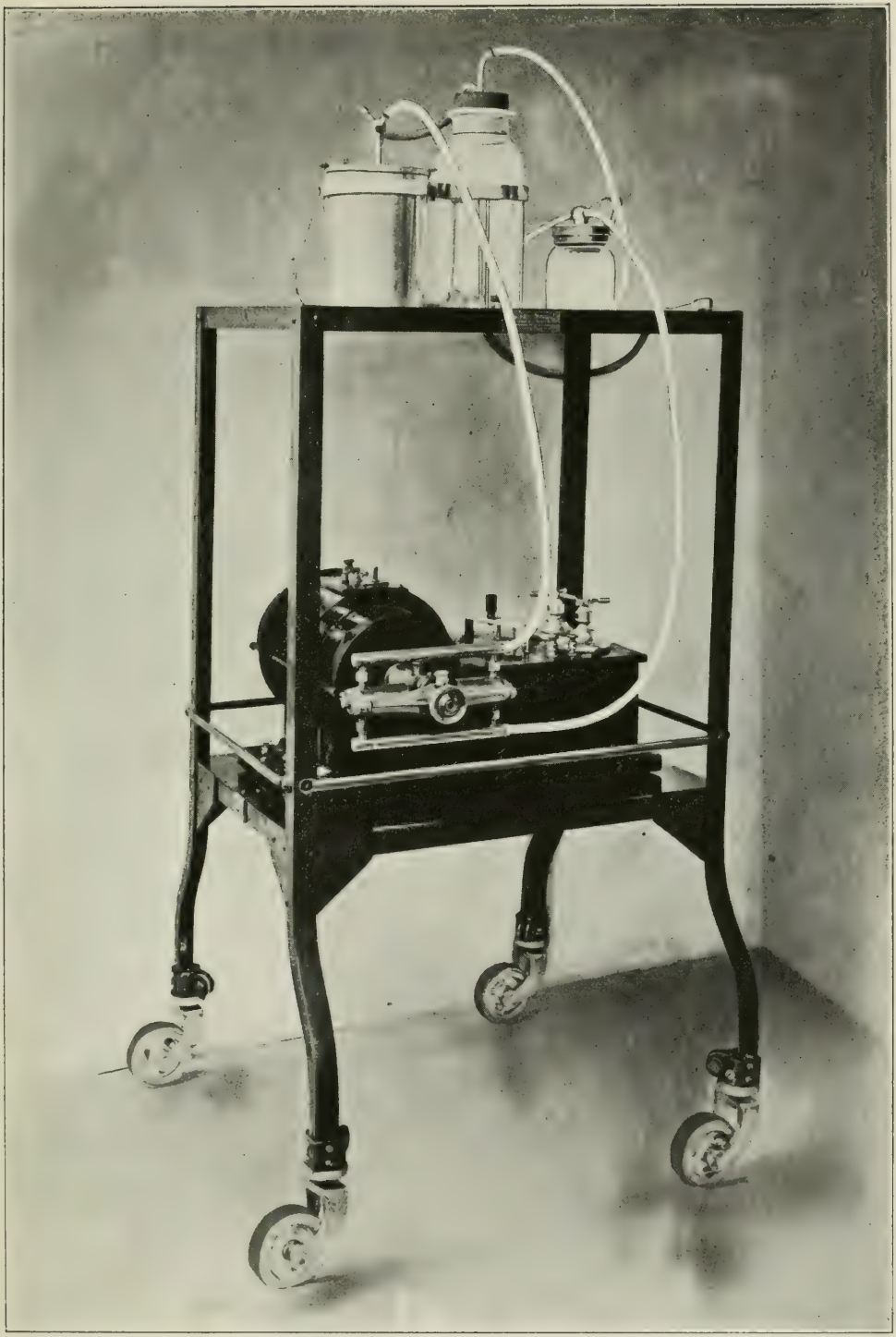


Fig. 10.

Prof. Rovsing of Sweden recommended: the rebreathing of ether by means of a somnoform apparatus. (Fig. 10.) About two ounces of ether is placed in the rubber bag, and after applying the mask firmly over the nose and mouth, the air valve is opened and the patient breathes air and a small amount of ether. When the air valve is partly closed, the ether vapor is increased until finally the valve is entirely closed and the patient breathes pure ether. This he continues to do until finally a quantity of car-



bonic acid will form within the bag. This is called the rebreathing of ether, since the patient exhales some of the excess. The carbonic acid is considered of benefit to a certain degree in ether anesthesia. Whenever it accumulates to an excess, cyanosis is present; the air valve is opened and some air is allowed to enter. This method of induced anesthesia we have found to be the least irritating and most satisfactory, although it requires a little longer to induce anesthesia than by other methods. The induced anesthesia is then followed by the forced vapor method.

The apparatus illustrated (Fig. 11) shows an ether bottle attached to a pump, run by a small motor, whose speed can be regulated (the Victor transformer cautery apparatus). This vaporized ether is forced through a small tank (Cain McDermot) which contains wound within it tubing surrounded by thermolite. This tank is hermetically sealed, and when placed in hot water for about ten minutes, heats up the thermolite; the latter holds the heat for some time. The ether which is passing through the heated tubes within this tank thus has its chill taken off and is easier of respiration, absorption and less irritating to the mucous membrane of the respiratory tract. From this tank passes the ether supply tube and its terminal mouthpiece. This latter acts also as a check retractor for better inspection. There is a suction bottle for the blood and mucus. From the pump, which has a double action of suction and pumping, a stiff rubber tube passes to the suction bottle, and connected with the latter is another piece of rubber tubing with a metal tube to be introduced into the throat, etc., whenever indicated. Suction is one of the greatest aids in the operation of tonsillectomy and adenectomy. Anyone having a motor may use the pump by obtaining the proper attachment.

In conclusion, I wish to say that in tonsillectomy, whatever method may be adopted, it is necessary that the operation be performed as rapidly as possible in order to utilize the pressure by the catheters to control bleeding. The operation as first suggested by Dr. Sluder, of St. Louis, or that one by Dr. J. Leslie Davis, of Philadelphia, is such as meets the occasion. The method that I recommend* and that I am able to use almost in every instance, is the one that gives me the best satisfaction in connection with this method of operating on the adenoids. I take the liberty of presenting two illustrations (Figs. 1 and 2) of my

*Tonsillectomy by Means of a Single Instrument, the Tonsillectome. Journal of the American Medical Association, June, 1912.

method of doing tonsillectomy without preliminary dissection, because the removal of the tonsils and adenoids, especially in children, is usually combined or performed at the same sitting.

I have not changed my technic of tonsillectomy from the one originally described, except in so far as it relates to this adenoid operation. I take exception to the criticism of Dr. Greenfield Sluder in the *Journal of the American Medical Association*, March 1, 1913. He states:

"In Beck's instrument the narrowing gap which is to do the cutting is a snare-wire loop, concealed and protected in the Vedder tip. As soon as the snare is pulled the loop is released from its rigid protector. It must then be trusted to follow in the connective tissue bed. Frequently it does follow nicely, especially if there are no adhesions between the capsule and the subjacent tissue. But should it not do so, the surgeon has not the power to tuck the tonsil into it, because he has nothing rigid to resist his pressure; the flexible wire bends with the tissues. He, therefore, has no rigid ring over which to pass the finger tip in forming his final judgment of when to cut. For these reasons the repair work which may frequently be necessary cannot be done, especially the removal of thin tough pieces, which is quite possible, usually, with the original model. A small finger tip is also a disadvantage for Beck's instrument. In other respects it is admirable, possessing the advantage of the slowly strangulating snare."

This can only occur when the operator is not entirely familiar with the technic. If once the tonsil is Sluderized (pushed through the ring of the tonsillectome) and the finger is pressed until the entire circumference of the ring is felt under the palatoglossus muscle, the wire is under constant control and will follow the contour of the tonsil and remove it in its entirety, with a smooth uninjured capsule and nothing else. Even the plicæ tonsillares, superior and inferior, remain, which is not always possible with the blade going from before backwards.

The one modification that I have made is to have a much smaller ring in cases of very flat tonsils and small tonsils of children, since a perfect operation depends on the entire cryptic surface of the tonsil being engaged in the ring.

I wish to illustrate a case of attempted removal of the adenoids, which evidently were only severed at one place and allowed to hang on and organize in the form of a polyp. (Figs. 7 and 8.)

Such an accident could not occur if the operation had been performed, even by a novice, by direct inspection, as I have described.

Since writing the above, the author has been in personal communication with Dr. George L. Richards (Fall River, Massachusetts), who referred him to his paper as published in the Transactions of the American Laryngological Association, 1907, page 184, in which he stated his practice of using the palate retractor. In justice to Dr. Richards, his description is appended.

"In young adults and older children, I have used a palate retractor first suggested to me by Dr. J. E. Schladle of St. Paul, Minn. This consists of a piece of tape twenty-four inches long, the ends of which for six inches are twisted and then coated with paste and dried. One end is passed through each nostril to the nasopharynx, grasped with a forceps and drawn out through the mouth, where it is held by nurse or patient. The tractor draws the palate well forward and allows the instrument to be easily inserted. Here cocaine through the nose and by way of the mouth answers for anesthesia."

While acknowledging priority to the Schladle-Richards method of retracting the palate, the author wishes to draw attention to the fact that the object of his retraction is different from that as pointed out in Dr. Richards' paper.

(1) Dr. Richards uses the tape method of retraction in connection with local anesthesia; the author uses it in connection with general anesthesia.

(2) Dr. Richards' object is to provide ample space for the insertion of the adenectome; the author's object is to operate in the nasopharynx under direct inspection, especially in the region of the eustachian orifices.

(3) Furthermore the author makes use of this method as an aid in the management and control of primary tonsillar hemorrhage by means of drawing the posterior pillars over the tonsillar fossæ.

DISCUSSION.

Dr. Goldstein: The antero-posterior diameter in the child is not unusually large and even if, for argument's sake, we should admit that the entire soft palate was removed, which is certainly more space than we get by any method of retraction, there would still be some difficulty in seeing the naso-pharyngeal vault. There is no doubt that you can see very clearly the posterior pharynx wall with a retractor in the palate, as suggested by Dr. Beck, but the place which offers the greatest difficulty in our adenoid work and where remnants are left following adenoid operation is at the lateral walls about Eustachian tube orifice and at the vault of pharynx,—two regions very difficult to

inspect by any method of retraction. While I have not used the suggested technic as a routine, I have seen Dr. Beck do this operation and expose the naso-pharyngeal space probably better than by any other method at our command. I have used a modified palate-hook in cases where I was doubtful and tried to get retraction and inspection that way, but I think that retraction alone is not sufficient to give an absolute view of the upper areas of the naso-pharynx.

Dr. Stillman: I would like to ask Dr. Beck if his method is intended to exclude other methods of observation during operation. For instance, if the presence of this apparatus will prevent palpation. If it does I think that would be somewhat against it. It strikes me that the best field for this method is in the preliminary examination before the operation. An adenoid operation is always a bloody affair. There is always a clot formation from rapid breathing and stasis of the blood, and in ordinary inspection my experience is that it is difficult to tell a clot somewhat organized from a tag of membrane. It strikes me that palpation with the finger point is just as important or more important than inspection while the area is in a bleeding condition. There is often a fringe of tissue left in the choanae that by palpation can be discovered and removed by the original Mayer curet, or something of that sort. I do not think that removal of these tags would be aided by Dr. Beck's apparatus unless assisted by palpation.

Dr. Levy: I do not think it is well to use the La Force adenotome to the exclusion of other methods. I use the adenotome followed by curet and rubbing with gauze.

Dr. Stein: I have seen this operation of Dr. Beck's and I can attest to all that he has to say as to the inspection of the field. To me, it is the logical way of operation; that is, by direct inspection. I have found it necessary to follow a similar procedure at various times because of the severe bleeding that we may get after a Sluder operation for the removal of the tonsil. The hemorrhage coming from the descending palatine artery I find can be checked immediately and completely, allowing one to proceed with the adenoid operation, by retracting the angle of the soft palate with simple retractors. I have used for this purpose an ordinary septum retractor, one on each side. A very good view of the naso-pharynx is obtained by shifting the child's position so that the head is dependent.

I would emphasize the absolute necessity for thorough anesthesia so as to get perfect relaxation.

To get a better view I have used the Yankauer instrument. You can get a beautiful view with the head dependent retraction of the soft palate with long retractors.

Dr. Iglauer: It occurs to me that Dr. Beck might have compared this operation with one that I described some years ago, before this society;—that is the method of stopping the hemorrhage from the adenoid wound, by passing a catheter through the nose and attaching a rubber sponge to the piece of the catheter that came out of the mouth, then after the operation, the nasal end of the catheter was pulled up into the nasal passage. If Dr. Beck would tie a sponge on the end of the catheter and then after doing the operation, pull the sponge into the nasal choanae and then pull it out he could inspect the cavity and see if the hemorrhage had ceased and entire mass had been removed.

I would like to ask Dr. Beck in closing to state definitely whether or not he can see the base of the adenoid, whether he simply sees a portion but not the stump of the adenoid.

I agree with Dr. Levy as to the use of the La Force adenotome. I really believe that this is a much better instrument than the ordinary adenoid curet.

Dr. Loeb: At last, we have something new about adenoids. I think that this is the only thing that takes it away from the usual in the adenoid treatment that I have seen in a long time, and while I am not ready to say that it is necessary, I must say that it merits a trial from everybody because it brings the adenoid operation in the range of the other work we have done, viz.: operations with inspection.

I don't take so gloomy a view as some of the others about the results of adenoid operations. From my experinece (I don't speak alone from my own work, but from the work of others that I know about), it does not seem to make so much difference whether the adenoid is completely removed or not. I don't mean I advocate leaving any, but I mean that if accidentally, through fault of technique or otherwise, some few tags are left, my experience is that no great trouble results. True in a few cases I have had, and I know some of the rest of you must have, the operation is not as complete as it should be and the symptoms recur. In these cases I suppose I should have been glad if I could have removed the adenoid according to the method of Dr. Beck.

I want to say that Dr. Beck's suggestion about the stopping of tonsilar hemorrhage is a very important one.

Dr. Stucky: I think Dr. Beck's paper especially good in that it calls attention to the importance of the adenoid operation. It is not regarded as an operation of any consequence by the majority of practitioners. Every country doctor, every crossroads doctor is doing the adenoid operation and doing it as a very simple thing and it is "done in a minute." Now, for some years, I have contended that the tonsil operation and the adenoid operation is a hospital operation and requires a good deal of care and attention. For years I have been exposing the wall of the pharynx where the adenoid is located; it is not always centrally located, it is not always laterally located, sometimes we have bunches protruding into the naso-pharynx, filling up the choanae, and cannot get these out with a curet such as we generally use, and even with Dr. Beck's splendid method which he advocates here, this method of drawing up the soft palate and taking the view, we don't get the adenoid out always, neither can we do it with our fingers, you cannot tell when all of it is exposed.

About four years ago, I had a postnasal hemostat made with which I grasped a piece of gauze sponge and with care not to use too much force, (there is usually too much force used in the adenoid operation, and the delicate membrane of the posterior wall injured by using so much force), but take this postnasal hemostat with the sponge and get well up into the crevices and rub it out thoroughly. We have so many secondary adenoid operations because of neglect in doing this. It is a delicate and an important operation.

Dr. Ballenger: First as ragged tags left. If you use the La Force adenotome you won't find such tags. I have been using the La Force adenotome as a part of my procedure for a number of years.

In using the La Force adenotome, you should select one suitable to the size of the epi-pharynx, and press firmly upward and backward. You do not get all the adenoid, but you get all the central mass except that just back of the septum, you never get that. For removing that part I use Dr. Barnhill's curet and bring it forward against the septum, press upward, and then with gentle movement backward and downward you will bring the piece of adenoid out on the curet. The third step is to introduce the finger with gauze covering it, and scrape the fossa of Rosenmuller to remove any remaining tissue or adhesive bands that may be present there. Now, as to tonsillectomy and adenectomy being a hospital operation: Dr. Stucky has for many years, along with others, insisted that it is a hospital operation. I have never had a death from tonsilar hemorrhage, but one from adenoid hemorrhage, and it was in a hospital, and under observation all the time. I find that hospitals are far from perfect institutions. This child was the

son of a surgeon, and in spite of that was allowed to bleed and lie in a comatose state, thinking he was asleep, until he died.

I would say that in the operation just spoken of, I did not use the La Force instrument. I used the Brandagee forceps you are all familiar with, and I must have injured the septal arteries, branches of the middle meningeal. A tampon at the right time introduced in the post-nasal space, would, no doubt, have checked the hemorrhage and saved the life of the child. As a matter of fact I do nearly all my operations in a hospital. Prolonged hospitalization depresses the patient, lowers his resistance and predisposes him to infections. This is the chief objection to hospitalization, especially for several days, in minor surgical procedures about the nose and epi-pharynx.

Dr. Barnhill: I am convinced that there is much value in the plan of operation of which Dr. Beck has just told us. It has for some time been evident to me that perhaps the worst work done in surgery is that done in the naso-pharynx. To go into the naso-pharynx and thoroughly curet out an adenoid, and be sure that the same is completely curetted out, is not easy. I mean it is not easy to know that we have done it thoroughly. Our past methods of curetting, and then feeling with the finger for remaining remnants are not reliable. What Dr. Beck shows us here in the picture represents that which we have all seen, not always in the other fellow's case, but sometimes in our own. I think that it is probable that twenty-five per cent. (I would make it more than that, but I want to be conservative), of all adenoid cases that are operated remain either not cured or have been operated a second time. Now, of course, that is not a good surgical record. Dr. Beck gives us a way of seeing whether we have done a thorough operation or not. I have never tried the plan of using the catheter and drawing the palate forward, but I have often used White's palate retractor for the same purpose. It is perfectly easy to adjust when the patient is held upright, and personally, I operate on both child and adult in the upright position. When the anesthesia is complete I put on the retractor just as I would at any other time with the patient in my office chair. If need be, one may use a mirror and by its aid adjust the adenoid curet to the exact size and position of the growth to be removed. Of course, the hemorrhage prevents one from seeing should he need to go back a second time with the curet.

What Dr. Beck says about the anesthesia is, in my judgment correct. No one ought ever to operate on any case of adenoid that is not thoroughly anesthetized. The rectum and the naso-pharynx are pretty nearly the last parts to be thoroughly relaxed by anesthesia. Bosworth a few years ago in his great classic said that one of the best reasons for using an anesthetic at all was to secure relaxation of the palatal muscles and certainly the operator will do the damage Dr. Beck stated he would do unless the patient is so relaxed, for when the patient is gagging under a halfway anesthesia the eustachian tubal orifices are brought close together, when, if a large curet is used, one may be chagrined to find that he has taken off a part of the naso-pharyngeal lips of the Eustachian tube. I think that is done oftener than most persons are willing to admit. The Doctor's paper is admirable and I think we might improve our technique by adopting his plan.

Dr. Levy: For many years I have used a plan somewhat similar on adults when operating under local anesthesia, although I have used only one catheter through one nostril and have tried to bring the soft palate forward by getting it pretty well into the median line. I have always been able to expose the nasopharynx pretty well, but never able to expose the region in the neighborhood of the eustachian orifice. From the drawing I don't gather that Dr. Beck's plan does, either. It seems to me that unless he does expose the walls of the nasopharynx close to the eustachian tube that the method is less valuable than it would otherwise be. Removal of the central adenoid is not as difficult as would appear from the discussion. I perhaps may be censured for

using an instrument that has given me a good deal of satisfaction, namely the adenotome. I have examined repeatedly after the operation and have always found a perfectly clean central nasopharynx, whereas formerly there were many tags left. A central adenoid is pretty easily removed. The difficulty arises in cleaning out Rosenmüller's fossa, and if by this method one can clean this particular region of the naso-pharynx he will accomplish a great deal. Otherwise, I don't think that this method is as valuable as it would appear.

Contrary to Dr. Barnhill's experience with the La Force Adenotome, I have found it very satisfactory and know of only one case that has given trouble from hemorrhage, and this did not occur in my practice.

Dr. Beck: This (illustrating) represents an early drawing or early proposition, when I used to do the adenoid operation before the tonsil and I consider that the difference between exposure then obtained and if you do the tonsillectomy first is very apparent; the latter is much to be preferred.

In the first procedure the bleeding from the adenoid bothered me in the tonsil operation. I used to draw back a tampon post-nasally and then go on with the tonsil operation. I think Dr. Goldstein saw that. I have discontinued that, because I do the tonsil operation first now, as I find that I can stop the upper bleeding almost entirely by getting my two pillars together by traction on the catheter.

Another gentleman brought out the exposing of the lateral part of the pharynx. By removing the tonsil and pulling on the rubber catheters you have the Eustachian tube almost before you, you are looking at it direct. As to exposure of the entire vault, I do not claim that I see the uppermost part of this region, but higher than by any other method.

This method does not exclude any other method of operating or examination. You palpate, you inspect, you can see direct or by the indirect method; you can use any instrument you please.

The first La Force instrument in Chicago I borrowed from Mr. Müller several years ago. I did an adenoid operation with it. Two hours later I was called to the house of the patient to stop a very severe bleeding. I went back to the Brandegee forceps, which I had then been using. About four years later I again attempted to use this instrument, because every one spoke so well of it. For five or six cases I had no trouble; then I had two children in one family, whom I operated on by this method the same day. About three or four hours later I had severe hemorrhages. This may be a coincidence, and I won't say anything against this instrument, because I had these three hemorrhages, but it is a personal grudge on that account. I think this a good enough reason for it.

Dr. Stein spoke of retracting with other retractors. Now, there is less traction and greater range of use for retraction with rubber catheters. I do not claim its origin. Pynchon says it is his. If he says so, let him have it. I suppose you would find it in the literature three or four hundred years before. I use it as a routine procedure and am very well pleased with it.

Dr. Levy said he employed local anesthesia and used retraction. I am not able to see that. To me, it seems, however well you cocainize, instinctively, as in tonsillectomies, there is a reflex action that causes spasms of the pharyngeal muscles.

Rose posture I would not use on account of the blood accumulating in the naso-pharynx, and you are bothered that way. You get good exposure by drawing head back and not drawing over edge of table, but this is only a matter of experience. I mention it simply as an objection.

Since you can see the vault better than by other methods, you can apply three, four, five artery forceps and thus stop hemorrhage better than any other method.

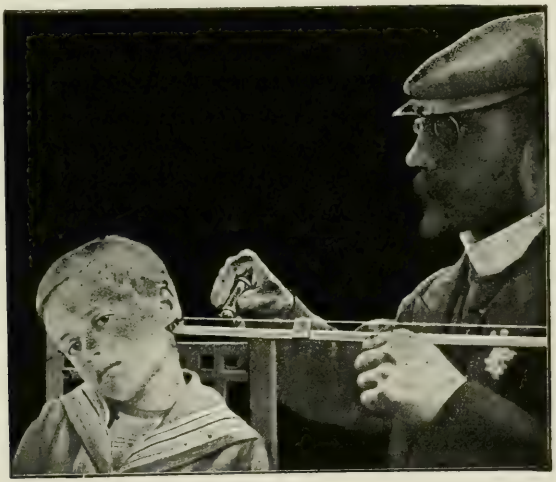
I think I have answered all the points brought up. If not, I will be glad to answer any other question the gentlemen may ask.

THE MONOCHORD.

By MAX A. GOLDSTEIN, M. D., St. Louis, Mo.

At the International Otological Congress in Budapest I had the pleasure of a personal demonstration of the monochord by its originator, Dr. H. J. L. Struycken, of Breda, Holland. At that time it did not attract the attention which it sincerely merits, because of the profusion of instruments and apparatus exhibited at this congress to illustrate every phase of acoustics.

Since then, however, the monochord has been demonstrated on several occasions and before several scientific bodies and has been



given a more serious consideration and more liberal practical application, until today it is recognized by many continental European otologists as an indispensable part of the apparatus required in making a complete functional test of hearing, particularly where the upper tone-limit of hearing is under consideration.

The principle of the monochord originally depended on the production of longitudinal waves of sound in the upper tone scale, and the original purpose as defined by Struycken was to substitute the monochord for the Koenig rods, high-pitched tuning-forks and Galton whistles in the perception of air-conduction.

The original claims made for the Struycken monochord were later augmented by Prof. Karl L. Schaefer, of Berlin, in that he added to the production of longitudinal sound-waves for determining the upper-tone limit of hearing, a scale of transverse vibrations producing a continuous series of tones from a^1 to the upper tone-limit and thus dispensing with many additional tuning-forks in the development of the Bezold continuous tone-series.

An additional valuable feature, as suggested by Schaefer and Struycken, was the determination of the upper tone-limit for bone-conduction, a phase of functional tests which is not applicable with any other sound-testing apparatus.

Another valuable feature of the monochord is its simplicity and accuracy of record.

In short, the complete functional tests of hearing may be now carried out by using the following apparatus: contra C, C, c^1, c^2 and c^3 tuning-forks and the monochord.

Description:—The monochord consists of a 60 cm. flat, steel bar on which a steel wire with adjustable set-screw is strung to definite tension. The tension of this wire is accurately measured by a simple control device, by means of which a fixed standard of tone may be obtained with each instrument.

A metal sliding-block traverses the steel bar from end to end, is held both to wire and bar by sliding spring-clips, and presents a sharp margin at the front surface of the bar over which it slides, so that the actual tone produced may be read on the combined scale, stamped on the flat surface of the bar.

This scale is indicated in centimeters from 1 to 50, and a second musical scale is recorded from g^7 to c^4.

On the superior surface of the bar the longitudinal vibrations are marked in thousands, in Roman numerals from VI to XXV, giving a longitudinally-vibrating range of tone from 6,000 to 25,000 v. d.

At the proximal end of the monochord is a rounded metallic button by which the apparatus may be pressed to the mastoid or brought in contact with any other bone-surface. The steel wire is attached to this button at one end and to the set-screw at the other. This button is guarded by a hollow sheath to prevent hairs or other disturbing elements from touching the instrument when it is pressed against the mastoid.

The longitudinal tone is evoked by stroking the wire in its longitudinal axis with a metallic rubbing-flask filled with tur-

pentine or benzine, supplied with a felt, automatically-moistened disc.

In moving the sliding-block up or down, thus shortening or lengthening the wire, the longitudinally-vibrating tone is respectively higher or lower.

To determine the upper tone-limit for air-conduction in a given case, the monochord is held with the contact-button near the meatus. The small felt disc of the rubbing-flask is thoroughly saturated with the turpentine or benzine in the container, placed vertically on the chord or wire, and drawn to and fro with slight pressure. If the hearing-perception of the patient for upper tones is fair, we may begin the test at a wire length of 30 cm., (about 8,000 v. d.). When this tone has been definitely heard by the patient, the chord is shortened by pushing the sliding block up (toward contact-button), and with the gradually decreased length of the chord gradually raising the pitch or tone until a distinct musical sound is no longer audible.

The sliding-block is adjusted ½ cm. at a time, until the actual tone-limit perceived is definitely established. The results may be recorded both in centimeters and in number of vibrations per second. For example, 25 cm. read on the scale of the monochord bar indicates 10,000 v. d.; 10 cm. read on the monochord scale indicates 25,000 v. d.

The upper tone-limit for bone-conduction is determined in a similar manner, with the additional feature of pressing the contact-button against the mastoid process. We first register the length of the chord and the number of vibrations constituting the upper tone-limit for air-conduction in the tested ear. The contact-button is then pressed over the mastoid and the patient continues to hear the longitudinally produced tone for ½ to 1 cm. further in the scale; in many pathological cases the perception by bone-conduction is from 5 to 15 cm. more than by air-conduction.

On the steel bar of each monochord instrument an arbitrary number, approximately 251,000, is stamped at the left-hand end. This number, divided by the number of centimeters noted in a given test specifies the longitudinal vibrations per second.

For example, my personal monochord instrument bears the test-number 250,800. At 10 centimeters (divide 250,000 by 10) the patient hears 2508 longitudinal vibrations; 40 cm., =6270 longitudinal v. d. In this way we have a simple formula for determining with accuracy the actual number of longitudinal vibrations.

Production of transverse tones:—Schaefer's modification of Struycken's monochord is for the production of tones of transverse vibrations. The great value of this modification is that by making the monochord serve as a test-medium for the upper tone-limit a continuous tone-series from a^1 to the upper tone-limit is obtained.

On every standardized monochord the longitudinal tone of 46 cm. wire length corresponds with the transverse tone of 3½ cm. wire length. Tones of transverse vibration are produced by striking the chord sharply with a light, small, wedge-shaped hammer for all tones between the full wire length and 15 to 20 cm. For all higher transverse tones a short, special violin bow is used, drawing same across the wire.

Tension Controller:—The tension controller consists of a thin, flat piece of steel definitely weighed, containing at its one end two small hooks or flanges, and at the other end a graduated scale indicating the test weight in kilograms from 10 to 25.

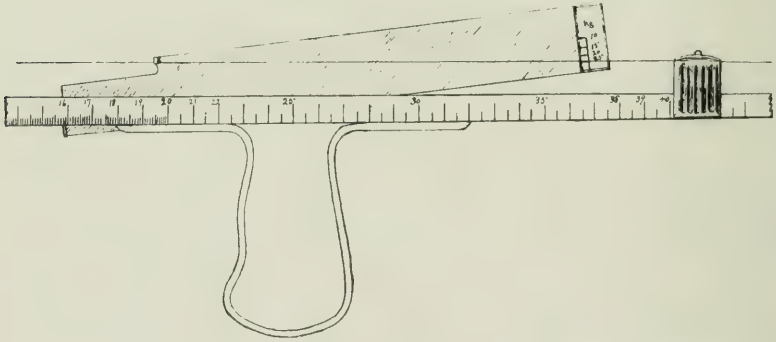


Figure 2. Monochord showing application of tension controller.

To standardize the wire of the monochord to the proper pitch place the sliding-block on 40 cm., hang the tension controller from behind with its upper hook over the wire while the lower one engages the monochord from below, tighten the steel chord by means of the tension-screw at the distal end of the monochord bar until the controller is raised to the scale-mark "25." At this point the wire has the proper tension and the standard pitch. To further prove this standard pitch, after testing with the tension controller, the sliding-bar is placed at 43 cm. on the scale; it must then vibrate in unison with the tone and pitch of the tuning-fork a^1 (435 v. d.) which accompanies the apparatus.

The tone at this chord-length (43 cm.) is 435 transverse vibrations and 5837 longitudinal vibrations.

Prof. K. L. Schaefer's Table for Estimation of Transverse Tones.

	C	C♯	D	D♯	E	F	F♯	G	G♯	A	A♯	B
					Octave of C¹							
								387,54	410,59	435,00	460,87	488,27
								48,3	45,6	43,0	40,6	38,3
					Octave of C²							
Number of vibrations	517,31	548,07	580,66	615,18	651,76	690,52	731,58	775,08	821,17	870,00	921,73	976,54
Length of wire	36,2	34,1	32,2	30,4	28,7	27,1	25,6	24,1	22,8	21,5	20,3	19,1
					Octave of C³							
Number of vibrations	1034,61	1096,13	1161,31	1230,37	1303,53	1381,04	1463,16	1550,16	1642,34	1740,00	1843,47	1953,08
Length of wire	18,1	17,1	16,1	15,2	14,3	13,5	12,8	12,1	11,4	10,7	10,1	9,6
					Octave of C⁴							
Number of vibrations	2069,22	2192,26	2322,62	2460,73	2607,05	2762,08	2926,32	3100,33	3284,68	3480,00	3686,93	3906,17
Length of wire	9,0	8,5	8,0	7,6	7,2	6,8	6,4	6,0	5,7	4	5,1	4,8
					Octave of C⁵							
Number of vibrations	4138,44	4384,53	4645,24	4921,46	5214,11	5524,16	5852,64	6200,66				
Length of wire	4,5	4,3	4,0	3,8	3,6	3,4	3,2	3,0				

The Schaefer table of transverse vibrations figured accurately to the scale as read off on the bar of the monochord is herewith presented. The monochord, therefore, presents a range for transversely vibrating tones of from 387 to 6200 v. d.

It is difficult to introduce an innovation in so stereotyped a system of examination as that of functional test of hearing; this is practically shown in the case of the monochord, for it is now over four years since Struycken first demonstrated this monochord. This reticence on the part of the profession is not due to the lack of the possibilities and practicability of the monochord as an accessory hearing-test apparatus, but to a conservatism that holds tenaciously to older and well-established methods. With our American otologists it is also partly due to the fact that many of them have been unable to assimilate the description of the monochord as originally published in Dutch and German.

Several of my personal friends among our confreres have had the monochord in their possession for months but have not used it because of insufficient stimulation or lack of sufficiently detailed direction for its application. This has induced me to present the monochord for practical consideration. It is easy of application, accurate and scientific in results, and develops phases of functional hearing-tests which have not been possible by any other means until now.

DISCUSSION.

Dr. Ballenger: I cannot discuss the paper. I am very glad to hear it because I have had one of these instruments for some time, and not being able to read German, I was not able to master it. I have the instructions now in the hands of a translator. I hope to have an audience with him before I go on it. I would like to get my twenty dollars out of it some way.

Dr. Beck: I have one of these instruments. I can read German and I have learned how to use it, but I have not the parts to produce the transverse vibration. After hearing Dr. Goldstein's remarks and instruction on it, and I am sure he has given it more attention than I have, I am going home and begin to use it. I have found that it took considerably more time than I am accustomed to give in using the ordinary series of tone formation. I do not wish to criticise the instrument or method, but only state my experience, or rather inexperience, with the monochord.

Dr. Goldstein: My sole object in presenting this apparatus is to bring it to the attention of the fellows and get those who have the instrument and know little about it to use it a little more practically, and those who have not as yet investigated the matter to see that there are some things being done in the finer methods of differential diagnosis of the upper tone limits that may be of considerable clinical value to them. I think that in presenting an English description of the instrument I may hope to stimulate Dr. Ballenger and some others to get their twenty dollars' worth out of the apparatus.

HYPOPHYSEAL TUMOR CASE, SELLAR DECOMPRESSION.

By DRS. BERENS AND SAUER.

Dr. Berens presented the patient and read the following history. Mr. S. D., white, aged 32. Coal miner formerly; saloon keeper now. Lithuanian (Poland Russia).

Complaint:

Was sent to me in October, 1911, because of palpitation of, and oppression over heart, causing anxiety and fear, weak generally, growing weaker. Also has gastro-intestinal disturbances, without undue provocation.

Family History:

Father died at 67, cause unknown, was of normal proportions. Mother 75, living and well; also normal physique. Brother living and well, 42, perhaps large, over average height and weight. Sister 52, dead, cause unknown. Family were all large, but not ill proportioned. Knows of no nervous, cancerous, tuberculosis or kidney diseases in family.

Previous History:

General health splendid until 17th year of age. He has had the milder exanthemata of childhood, but no scarlet fever, diphtheria, rheumatism, St. Vitus dance, typhoid fever, pneumonia or malaria. He denies venereal disease or sexual over indulgences, and has been moderate in habits as to tobacco or drink.

Personal History:

At the age of 17 began to have slight headaches, never severe, but at times periodical and constant, frontal in character and especially early mornings. Some ten years ago the symptoms increased, plus visual disturbances, most prominent in left eye, then gradually the right eye began to show similar disturbances, and cannot now see as well with left eye, suffers from cardiac excitability.

Examination head:

No deafness, no ear discharge, odd feelings in head.

Cardio-respiratory:

No cough, no dyspnea, no edema, perspires easily.

Gastro-intestinal:

Good appetite, some dull pains in stomach and around heart, no nausea, no vomiting, eructates at times sour material, bowels regular.

Genito-urinary:

Urinates regularly, no gonorrhœa, or syphilis.

Neuro-muscular:

No convulsions, numbness or periphereal pains, has normal sexual powers and desires.

Quit work as a miner because of weakness and cardiac distress.

Examination:

Patient large, thick set, white male adult.

Abdomen:

Negative, no enlargements palpable of spleen or liver. Penis no scars, good development, likewise testes of normal consistency. Normal knee jerk, no Babinsky, no clonous, no edema of legs or ankles, some veins enlarged. Both feet large, large toes quite abnormally thick, others above normal, bones of legs and thighs not irregular or equally or proportionately enlarged. Spade-like hands, large fingers, short thick thumb 9 cm., middle finger 9 cm. Teeth show marked separation owing to enlargement of lower jaw. Tongue is also large.

Ophthalmic examination:

Pupils not dilated, respond to light, discs unusually bright and shining, optic atrophy slight, no vessel engorgement nor tortuous. Vision good, right eye 15/12, left 15/200.

During year of observation, very little difference in any condition, mental or physical, are noted, with the exception of marked decrease in vision in left eye.

Nose:

No discharge.

Over skin of thorax, abdomen and back are numerous nodules, firm, fibrous-like in feeling, not tender, and are movable.

Dr. Berens referred the patient to the chairman on October 24, 1912. The eye examination showed that there had been a marked loss of vision during the past year, and the oppression about the heart made him unfit for duty. I therefore decided to operate.

The patient was sent to the Deaconess Hospital on November 28th, and the following day after the usual preparations for a

submucous resection of the septum, he was sent to the operating room. The septum and the region of the anterior walls of the sphenoid were carefully cocainized with a 20% solution of cocaine. In addition a ½% solution cocaine was injected on each side of the septum near its posterior end. The septum was deviated to the left anteriorly, and the right posteriorly. The middle turbinate was removed on the left side, after which a submucous resection was done in the usual way. The mucous membrane on the anterior wall of the sphenoid was pushed to the side, until the openings of the sphenoid were reached. These openings were then enlarged and the partition between the two sphenoid cavities was then removed. The upper wall of the sphenoid was found to be much lower than usual; it appeared to be bulging down into the cavity. The upper wall of the sphenoid cavity was then opened by means of a chisel. This opening was then enlarged by means of a punch forceps. The bone was not as thin as I had expected to find it, but there was no difficulty in removing it. An opening about 1 cm. by ¾ cm. was made. The dura was incised by means of a sickle-shaped knife. This incision was very painful, but I managed to make a crucial incision; the patient requested that I discontinue. The mucous membrane covering the anterior wall of the sphenoid was torn to such an extent that I packed the nose in the usual way, and did not pack between the mucous membrane as recommended by Hirsch. The pack was removed at the end of 24 hours; there was no unusual bleeding or any other usual symptoms following the operation. The patient noticed a marked difference in the heart's action and stated that he felt much lighter; he particularly noticed that the foul odor he had previously noticed had disappeared. The patient left the hospital 10 days later.

An ocular examination by Dr. Parker shows the following: Eye examination was as follows: Conjunctiva, cornea, anterior chamber and iris, normal. Reaction to light better in right than left. Accommodation better in right than left. Visual acuity in right normal, left 17/120; could not be improved.

Ophthalmoscopic examination: Right showed very slight beginning atrophy; left fundus on the temporal side looked clouded and markedly thinned, and in places disappearing entirely. Nasal half vessels much more easily defined.

Color field: Much contracted, especially temporal side of left eye, also interlacing.

December, 10, 1912. Vision, right normal, while left was much improved; vision 17/60. January 2, 1913, patient feeling and looking much brighter; right eye, vision normal; left 17/50. February 1, 1913, right normal; left still improving; vision 17/40.

DISCUSSION.

Dr. Beck: I would like to ask you what difficulty you found in chiselling off the upper portion of the sphenoidal wall.

Dr. Sauer: There was no difficulty; I used a long, thin chisel.

Dr. Goldstein: How did the hypertrophy present? Could you verify the picture?

Dr. Sauer: Yes. The floor of the sella was plainly to be seen.

Dr. Goldstein: What was the direction of the hypertrophy?

Dr. Sauer: Downward. In passing the probe into the opening of the sphenoid, you immediately came upon the upper wall of the sphenoid. In other words, there was a bulging downward of the floor of the sella turcica.

Much hemorrhage?

Dr. Sauer: Practically none.

Dr. Barnhill: How much floor did you take away? Of course, if the tumor was very large, there would not be much relief unless you took away a great deal of the floor.

Dr. Sauer: The opening was about one-half cm. wide and one cm. long.

Dr. Beck: What speculum did you use?

Dr. Sauer: The long Killian speculum.

Dr. Goldstein: Has there been any change since the general condition?

Dr. Sauer: Yes, he is able to work, and his vision has greatly improved.

Dr. Beck: Have you measured the hands since the operation?

Dr. Sauer: No.

Dr. Beck: May I ask if you are familiar with the method of measuring the size of the hands?

Dr. Sauer: Yes; measure the amount of water the hand displaces.

Dr. Barnhill: It is easy to see how it would relieve symptoms such as tachycardia, due to pressure.

Dr. Sauer: Cushing now does a sellar decompression, taking a small part of the tumor. I intended, when I started, to take away a part, but the incisions into the dura being painful, the patient requested me to do nothing further. Should there be any indications, I will operate again. Hirsch has operated on some of his cases four times.

How would you do it the second time: Again split your membrane?

Dr. Sauer: No, I would not disturb the septum, but would attack it through the left nasal passage, which offers sufficient room, because the middle turbinate has been removed on that side.

Dr. Sluder: In connection with this case, I am reminded of a case which I got hold of about two weeks ago. This patient had been to many doctors, and finally crossed my path. The man is some six feet two and one-half inches tall; weight 320 pounds. He is an enormous weight, big enough bones. This is, I should suppose, simply acromegaly. This other was probably gigantism. He was enormously fat. The picture of his cranium showed it twice the size it should be. I could not hold him. He went back into the service of the Washington University Hospital, and when it was learned that I made the request that I see what was to be done to him, they let me be present, and I saw the performance of nising the lip in the hands of Dr. Sachs. I am reasonably sure that in that man's case there could not have been more than half the space that this man's cranium presents, in his nose; that is, his whole external nose partook of such a condition and there never was at any time the illumination in the recumbent posture that I am sure could have been gotten in a rhinologist's work in the erect posture. I asked Dr. Sachs what was the objection to removing the posterior one-third of the septum, cutting it away and going back. It seemed to me the most rational and, from the anatomic condition, best suited to get the greatest space. He stated that the submucous septal route was outside the nose. I said, "The nose is a sterile cavity under normal conditions." He seemed to be doubtful about that. I told him that considerable experimentation had been done by Dr. Fred C. Cabot of Boston, and a great many cases had been observed and reported, in which he seemed to prove that the normal nose is sterile; after approximately one hundred cases he found the normal nose sterile. Now, it seems to me that under these conditions, Dr. West's technique would certainly have afforded the advantage of giving twice the space. With a dilator, he forcibly crushed the turbinates laterally to make space. What the outcome of the case is, I do not know. It was only two or three days ago, I think, that it was done. The general anesthetic and the additional surgery required, it seems to me, must have been vastly greater than utilized in reaching the sphenoid. If the nose can be considered as a sterile cavity, it seems to me that the technique of Dr. West has most distinct advantages. It clears the whole thing. Perfectly familiar to all of us must be the picture of a luetic loss of the septum, the expanse of the nose when the septum is out reproduces that state of things.

Did I understand you, Dr. Beck, to say that Dr. Cushing does Dr. West's technique?

Dr. Beck Yes, sir, I am informed that is the way Dr. Cushing is doing now.

Mr. Chairman, may I have the pleasure of complimenting you on the result of your case, perhaps the first case operated on by a rhinologist on the living in this country. I had the pleasure of presenting this subject in a symposium before the Chicago Ophthalmological Society last week, giving a resumé of the various techniques employed in operation on the hypopluses and, furthermore, gave my results on dead bodies with the various operations. The last work of Hirsch's (in the Archives für Laryngologie of November) in which his results are so beautiful, he reported twenty-six cases with only three cases of bad result, some of them operated on three or four times. He has shown that this operation belongs to the rhinologist, because he is familiar with the field, especially since he is now so familiar with the operating on the sphenoid. Of course, I can appreciate the difficulties, such as bleeding, etc., that may be present under general anesthetic and certainly under local we can control that. The operation as suggested by Hirsch is the easiest, quickest and most roomy one you can

do, if you work your way all the way to the bony septum as far back as the rostrum, and then use Hirsch's dissector, a long instrument, dissecting and pushing away the mucosa and periosteum from the anterior wall of the sphenoid, and then after you have combined the two sphenoidal cavities by breaking down the septum, chisel off the portion of the rostrum and you have a beautiful large cavity. The speculum I have adopted in my cadaver work is the Kocher speculum. Kocher has divided the operation of splitting the nose externally in the middle line. As I have said, the general surgeons do all sorts of mutilating operations, pulling the nose down, etc., which really gives them less room. This Kocher speculum is very good, I think.

I made an experiment, or rather I worked on and developed the technique of reaching the cella through the antrum. I have done three or four operations of raising the face, not for this same purpose, and it certainly is a different way than getting to the sphenoid and doing it as Dr. Sauer has.

The earliest signs of the disease are ocular. The ophthalmologist is able to discover these cases and get to them early when the big bone changes are not yet present, and there is not so much degeneration going on. The proper development of the technique of the nasal route is up before us now.

SOME ATTEMPTS AT THE INTRANASAL TRANSPLANTATION OF NASAL TISSUES.

(Preliminary Report.)

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The free transplantation of tissues has been extensively employed in general surgery as exemplified especially in the grafting of skin and in the transfer of bone and cartilage.

In the rhinological literature on the other hand, there are very few references to this procedure. Marx[1] reports a case in which he successfully transplanted some fat tissue into a defect remaining after a frontal sinus operation. Portions of the septal cartilage, after being removed in a submucous operation have been successfully replaced by Goldsmith[2] and by Kerr.[3] Von Eicken[4] has obtained excellent results through Thiersch skin-grafts introduced into the nasal cavities for the correction of synechia. The implantation by Flatu[5] of ivory pegs into the nasal cavities in order to stimulate bone-formation in atrophic rhinitis can scarcely be classified as a true transplantation operation.

Sometime ago it occurred to me that there were certain intranasal conditions which might be benefitted or relieved by the free transplantation of the nasal mucous membrane with or without the underlying bone. Thus, in atrophic rhinitis it seemed promising if one could narrow the wide nasal passages by the introduction of normal bone and mucous membrane. The introduction of mucous membrane grafts to prevent the formation of synechia naturally suggested itself. The free transplantation of mucous membrane for the closure of small septal perforations also seemed worthy of trial. Furthermore, all of us have seen the results of some turbinectomy operations in which we devoutly wished that some of the tissue which had been removed might be restored.

Accordingly, in a limited number of animal and clinical experiments, I have undertaken the free transplantation of nasal tissues. Before describing these operations it may be well to consider some of the general principles underlying transplantation.

Tissues may be transplanted from one part of the body to another part in the same individual, constituting autoplasty; or, the transfer may take place from one animal to another of the same species, constituting homoplasty. Experimental and clinical experience have shown that in all instances autoplasty will give much better and more certain results than homoplasty. "The more highly differentiated the cells, less the prospects of successful transplantation. Homoplasty succeeds best with the connective tissue group, such as fascia, tendons, periosteum, bone and cartilage," (Axhausen)[6]. Lexer[7] states that epidermis as well as mucous membrane cannot be permanently grafted from one individual to another, while Schoene affirms that skin transplantation may at times succeed between animals closely related, and but rarely between those not related.

Despite the recorded difficulties and failures in the homoplastic transplantation of mucous membranes, I determined to try the procedure. It seemed possible to me that the nasal mucosa might behave differently from other mucous membranes, since its deeper layers are really periosteum, which lends itself readily to transplantation. Furthermore, the excellent results recorded with bone transplantation in general made it likely that the submucous implantation of nasal bones would prove efficacious. Two methods of transplantation were employed. The first consisted in surface transplantation onto denuded areas, comparable to Thiersch grafts.

The second procedure was by submucous implantation; i. e., placing the transplant into a pocket formed by elevating the mucosa. In two rabbits autoplastic surface transplantation of mucous membrane containing a sliver of bone was undertaken. In one of the animals the transplanted tissue was found in situ, loosely attached and imbedded and had apparently survived after two weeks. In the second rabbit in which the transplantation had been made into the lateral wall of the nose, the graft was found necrotic at the end of twenty-seven days.

In a dog the following experiment was performed. An opening was made into the nasal fossa on one side and some of the mucous membrane and underlying bone were taken from the turbinated body on the same side. This tissue, about the size of a five-cent piece, was immediately transferred to a tunnel formed by elevating the septal mucosa in the same animal. At the end of 17 days the animal was killed and macroscopically the transplant was found alive and in good condition.

The microscopic report by Dr. Brown is as follows:

Fig. I. The section shows the transplant firmly in place inside the raised mucous membrane. It is very vascular, seems to be in a healthful condition. Signs of survival are present inasmuch as some of the cell nuclei stain rather well. Spicules of bone and cartilage are present. Mucous glands are in evidence in the transplant.

Slide II. (a) Shows about the same condition. (b) Practically similar with slight indication of growing cells.

In none of the above is there any sign of infection and no evidence of an atrophy of the transplanted tissue, nor of its conversion into scar tissue.

Figure 1. Section (magnification 4-1) through a transplant placed under the perichondrium and periosteum of the nasal septum of a dog. S. C., septal cartilage. B. S., bony septum. M. P., mucoperichondrium. M1., P1., same, elevated to form a pouch containing T, the transplant. At X the transplant is firmly united to the bony septum. (Microphotograph by Mr Charles Goosmann.)

A similar experiment in a rabbit showed the tissue intact after three weeks. The *microscopic findings* were as follows:

Slide I. (a) The transplant seems to be firmly in place under septal mucous membrane. The transplant is highly vascular and in most places shows a comparatively dense round-celled infiltration in the fibrous stroma. The infiltration extends sharply into areas of partially absorbed bone and cartilage. The tissue on the

whole appears healthy, and no signs of infection are present. In one or two places there seems to be a union between the transplanted tissue and the mucous membrane under which it had been placed.

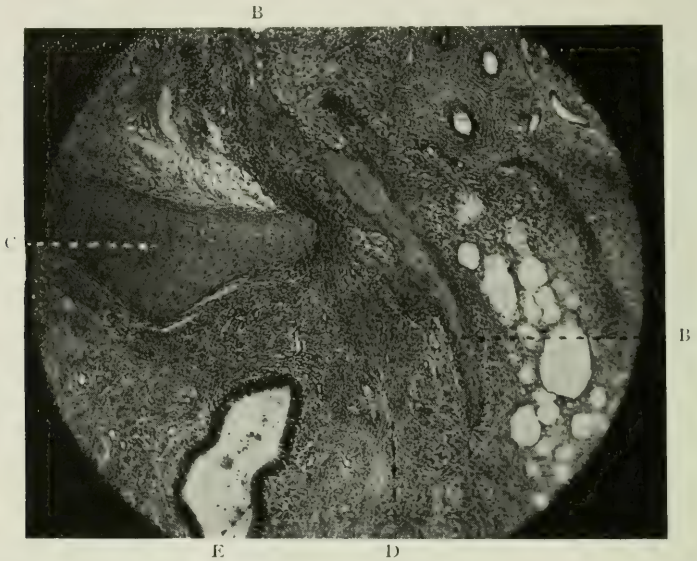

Figure 2. Higher magnification (100-1) of another portion of transplant illustrated in Figure 1, showing intact condition of bone, B. B. Cartilage, C; connective tissue, D, and glandular epithelium, E. (Microphotograph by Dr. Charles Goosmann.)

Clinical Cases.

I have the following clinical cases to report:

Case I. Submucous transplantation of a turbinate for the relief of *atrophic rhinitis:* H. S., aged 20, male, consulted me Nov. 20, 1910. Chief complaint, dry throat and stuffiness in the nose. Patient had always been well, except for occasional frontal headaches, which he attributed to the nasal condition.

Onset: About a year before suffered with very dry throat, worse at night, sense of smell less acute than formerly. Very few crusts in the nose without ozena. Had been treated at two dispensaries for eleven months and had used washes and an atomizer.

Present Condition: Pharyngitis sicca, especially on the posterior wall. The inferior and middle turbinates on the right side are hypertrophied, and covered with thick mucous. The right

middle turbinate touches the septum. On the left side the inferior turbinated body is atrophied so that the pharynx is visible through the inferior meatus. The middle turbinal is hypertrophied, boggy at its lower margin, which overhangs the inferior turbinal and touches the septum. There is a small scar on the septum, which deviates slightly to the right.

Diagnosis: Simple atrophic rhinitis affecting left inferior turbinate. Pharyngitis sicca.

First Operation: Nov. 10, 1910. An electro-cautery was applied to the inferior turbinal on the left side and to a point immediately opposite on the lower external border of the middle turbinate, with the idea of producing adhesions between the two prior to the transposition of a portion of the middle turbinal into the lower meatus.

Examinations two and four days later failed to show any adhesions. Eight days later the middle turbinal was freed by an incision occupying about one-half of its attachment, causing it to drop down in contact with the lower turbinal. Cautery applied to points of contact and packing introduced to hold the turbinals together. Examination one month later failed to show any adhesions, despite repeated cauterization.

Second Operation: Feb. 25, 1911. *Submucous transplantation of a turbinate.* A submucous elevation was made through a small incision on the left side of the septum opposite the inferior turbinate. (Width of the uncocainized nose 8-9 mm.) A turbinate which had been removed at the same time from an otherwise normal adult was then shaved down to form a wedge containing a spicule of bone. This wedge was about an inch and a quarter long and a quarter of an inch at its thickest part. It was introduced into the submucous tunnel with the bone in contact with the septum, and was thus completely covered. A small piece of mucous membrane was also transplanted onto the raw surface of the middle turbinal on the same side. Examination about two weeks later indicated that the transplant had survived in its new situation. One month later there seemed to be some atrophy of the transplant, as the lumen of the inferior meatus was increasing in width. April 20, 1911, the septal mucosa overlying the transplant was incised along the crest of the transplanted tissue, which was thus exposed and found in good condition and firmly united. Subsequent examinations at various times indicated that the transplant was gradually being absorbed. January 22, 1913,

examination showed transposed middle turbinate in situ. There is a slight swell at the site of the implantation, but the transplant seems almost entirely absorbed.

Case II. Surface transplantation of mucous membrane. N. S., male, aged 16. Chief complaint: Formation of crusts in the nose. The condition had started several years before with the discharge of mucous from both nostrils and later with crust formation. Crusts occasionally slide into the pharynx and are hard to dislodge. Gradual diminution in the sense of smell, can sometimes notice odor to crusts, occasional hoarseness.

Examination: Septum somewhat deviated to the right. Right side almost normal. Left side, atrophy of the inferior turbinal so that the pharynx is plainly visible through the nose.

Operation: Sept. 4, 1911. A portion of the hypertrophied middle turbinate was removed from an otherwise healthy girl of thirteen. After rinsing the specimen in saline solution it was transferred to a cross-shaped denudation of the septum of the recipient. The denuded area was opposite the inferior turbinal and a small strap of mucous membrane was left to hold the transplant in position. A light pack was introduced. Sept. 9, 1911. Transplant adherent and healthful. Meatus narrowed so that the transplant is in contact with the atrophied inferior turbinal. Sept. 17, 1911. Transplant adherent, growing, somewhat smaller than before. Sept. 19, 1911. Transplant growing nicely.

Case III. Free transplantation of mucous membrane onto the surface of a syphilitic stenosis of the nostril: J. S., aged 33, male. Patient had lues fifteen years ago. Nasal obstruction dates back about three or four years. Received salvarsan two months ago. Diagnosis: Slight saddle nose. Cutaneous web just within margin of the vestibule, closing the nostril except for a very small central opening. Complete atrophy of the inferior turbinate on the right side, a few crusts on the middle turbinate.

Treatment: Incision of the cicatrix followed by the wearing of a metal splint. Sometime later an attempt was made to graft mucous membrane onto the denuded area, but the graft failed to hold.

Case IV. Transplantation of mucous membrane for the relief of simple atrophic rhinitis. W. S., aged 18, male. Chief complaints:—Hacking cough, crusts in the left nostril and dry

throat. The trouble dates from childhood. In April, 1910, I injected paraffin under the septal mucosa of both sides of the nose. This was followed by less dryness in the throat and absence of crust formation in the nose. This improvement continued until a month ago, when some of the paraffin came out from the left side with the return of some of the previous symptoms.

Examination: Partial atrophy of lower turbinate on left side with the ridge, due to the parafin, still present on the right side. Left nasal passage was patent, especially opposite the inferior turbinal. The pharynx, which was smooth and somewhat glazed, could be seen through the nose on the left side.

Operation: July 1, 1911. Under cocaine anesthesia a cross-shaped incision one and a half inches long, similar to Case II, with a strap of mucous membrane to hold the flap was made along the septum opposite the left lower turbinal. A piece of hypertropied mucous membrane was removed from the middle turbinate of another, otherwise normal male patient. The transplant was washed with normal salt solution and then placed on the denuded cartilage under the strap. The cavity was lightly packed with gauze, which was removed thirty-six hours later and showed the flap in place (apparently). July 8, 1911, transplant is growing nicely, some granulations along the line of incision. Transplant is in contact with the lower turbinate. Patient states that throat is not as dry as before operaion. About one year later the transplant was still present, but had shrunken somewhat. January 25, 1913, about a year and a half after the operation, the site of the transplant is still evident, but it does not stand out as a ridge.

Case V. Transplantation of bone and mucous membrane into the septum for the relief of atrophic rhinitis. A. R., aged 18, male. Complains of headache, ringing in the ears and throbbing in the head. The trouble began three or four years ago, has crusts in the nose and has lost the sense of smell. Examination:—Atrophy of right lower turbinate. Hypertrophy of the right middle turbinal with small polypi anteriorly. Marked atrophy of the left lower turbinal, leaving the meatus wide as a lead pencil, with pharynx plainly visible through the nose. Creamy pus in both nostrils, especially surrounding the polypi. No ozena.

Diagnosis: Atrophic rhinitis with ethmoiditis on the right.

Operation: Nov. 30, 1912. Submucous elevation along the septum on the left forming a tunnel about one and a half inch

long and about one inch wide. (Cocaine adrenalin anesthesia). A portion of the hypertrophied middle turbinate of Mr. A, after being submerged in salt solution for about ten minutes, was transplanted into the tunnel. This piece of tissue, about a half inch long and a quarter of an inch in its other diameters, consisted of mucous membrane containing a sliver of bone. Bone placed in contact with the denuded septum, flap pressed down, apposition perfect, meatus very much narrowed. Dec. 14, 1912. Transplant still in situ, slight retraction of the mucosa at the line of incision, no pus. Patient complains of slight pain in the left eye. Jan. 11, 1913. Some granulating area at the line of incision. Probe introduced here gives the slight sensation of bare bone. A longitudinal incision over the entire length of the graft with the formation of a flap of septum mucous membrane was turned down, exposing the mucosa of the transplant, which appeared normal. February 11, 1913. Transplant in excellent condition, closes up meatus to a very narrow slip.

Cases VI and VII. Two attempts to close a septal perforation with transplanted mucous membrane. On April 22nd, 1912, I performed a submucous septal operation on Mr. C. S., aged 24. During the operation the septum was torn at the site of the original incision. Thereupon I removed a small piece of mucous membrane from one of his turbinals and placed it into the perforation. This transplant failed to hold and came out in a few days. February 13, 1913, I again attempted to close the perforation, which was about a quarter of an inch in diameter. Cocaine and adrenalin were applied, and a button-hole incision made in front of the perforation. The mucous membrane surrounding this perforation was slightly elevated through this incision. A piece of mucous membrane somewhat larger than the perforation was taken from the hypertrophied middle turbinate of E. B., a healthy boy of thirteen years. It was preserved in salt solution for about thirty minutes before being transplanted, and was then placed under the elevated mucosa surrounding the perforation. Three days later the transplant was still in position, and appeared somewhat dark in color. Eight days later, the transplant was still in position except at a point occupying about a fourth of the circumference of the perforation. The transplant seemed visible and when rubbed became hyperemic. (Note—Since the above was written the transplant has shriveled and come away).

Conclusions.

If we analyze the results obtained in this rather limited series of experiments, we find that there are no especially technical difficulties in the transfer of intranasal tissues from one individual to another of the same species. Surface transplantation in animals will probably fail owing to the difficulty in preventing infection. The submucous transplantation in animals should yield much better results, and the tissues seem capable of growing in their new environment. The experiments were not carried on long enough to determine what ultimately becomes of the transplanted bone, but it is practically established at the present time that transplanted bone is absorbed, that its framework serves as the scaffolding for new bone which is regenerated in its place.

In the clinical experiments, surface transplantation does not seem to offer very great prospects of success, although the grafts will adhere if the mucosa be slightly elevated to receive them. Submucous transplantation of nasal mucous membrane and underlying bone can be carried out with good prospects of the survival of the transplant without suppuration. It seems, however, that in the course of time, the transplant tends to be absorbed. It may be possible to prevent this resorbtion by the removal of the roof of the tunnel in which the transplant has been placed. This procedure may stimulate the transplant to functionate and thus prevent absorption.

At any rate, facilities for attempting the transplantation of mucous membrane and nasal bone are abundant in every rhinological clinic, and with due precautions as to the source of the tissues these experiments may be advantageously continued.

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DISCUSSION.

Dr. Goldstein: I want to congratulate Dr. Iglauer on the good work he is doing in this direction. It certainly opens up an unusually wide field for the experimental research. It will afford, eventually, definite and permanent results in plastic surgery. Theoretically, with-

out having any practical experience with this work, I should say that the more definitely active, physiologically, the character of the tissue is in which the transplantation is done, the greater might be the possibility of success in the transplanted portion of the tissue. In other words, I gather from the report of the cases that the Doctor has given, that in those cases of atrophic rhinitis, where the mucosa is fairly well stripped of its physiological functions, where the mucous glands are almost restored, and where the surface mucosa is no longer functioning physiologically, and where the vascular supply has been very materially choked off, poorer results were obtained than where the mucous membrane was normal. Where the transplanted material was put on the perichondrium, it showed a greater tendency to survive.

Dr. Barnhill: If I have understood Dr. Iglauer correctly, he attempted to transplant tissues into a matrix that were of very dissimilar structure to the matrix, as for example, mucous membrane to mucoperichondrium, and bone to cartilage. It is my teaching and belief that death of the graft when so transplanted must inevitably follow, or the nature of the transplanted structure must be changed by absorption of dissimilar cells. Hence, should a transplant of mucous membrane which is covered by columnar epithelium, and which contains mucous glandular structure be inserted under the mucoperichondrium it would seem very probable that death of the graft by sloughing would take place. I should much like some fuller discussion by the author of the paper on this phase of the subject.

Dr. Levy: The subject is of interest to me through the work of one of my clinical assistants, Dr. Cooper of Denver, to whom I wish to give credit for this statement. All the atrophic cases coming to our clinic have been given to him, and he has been doing transplantation. His results up to this time have been entirely unsatisfactory, the plants not taking. It occurs to me that one reason for the failure of the transplant is that this new tissue takes on the same processes that are going on in the nose at the time; in other words, an atrophy. Whether we accept the specific theory as the cause of atrophy or not, we are certainly not in a position at the present time to say what the etiology of atrophic rhinitis is. It is, of course, within the range of understanding that the same process or etiologic factor will continue to operate and attack the transplant that is going on in the nose at the time.

Dr. Ballenger: The question has been raised as to whether the transplant will survive equally well under an atrophic as under a normal membrane. Dr. Iglauer said it would, and in proof of this he cited, Case I, which I doubt very much was atrophic rhinitis. The disease was probably hyperplastic; in other words, he probably had an ethmoiditis with an oozing discharge which flowed over the inferior turbinal membrane, and such a discharge often causes a more or less permanent contraction of the mucous membrane of the inferior turbinate, thus given the appearance of atrophic rhinitis, when in fact it is not atrophic rhinitis at all. In other words, a skiagraph would have shown sinusitis in the ordinary way, and therefore, contraction of the inferior turbinal membrane. The membrane was more nearly normal than the Doctor thought.

Dr. Barnhill's question, I think, was very pertinent, that is, in transplantation of tissue normal to the part, one might expect a better result. I think in atrophic cases where we want to reduce the calibre of the breath-way if we transplanted cartilage tissue we would get a good result. Of course, we know cartilage tissue has been used. I would ask Dr. Iglauer if he has used cartilage instead of bone and membrane.

Dr. Goldstein reminds me that cartilage would be absorbed. So would other tissue probably be absorbed. We expect the transplanted

tissue to be absorbed, but in its place we get a deposit of connective tissue which leaves more or less thickening. Cartilage would also leave permanent thickening, so perhaps would paraffin, by being replaced by connective tissue.

Dr. Beck: I find Dr. Iglauer has certainly stolen my thunder in the work he has been doing. Yesterday, Dr. Stucky and Dr. Matthews saw two cases of this type in which I successfully performed the transplantation of bone from one part of the body to the other, or one patient to another.

In the first place, the Doctor gives the division of autoplasty and homoplasty, and I think he should add that of heteroplasty, which is classically correct. We have in the first place from the individual the same tissue as the tibia to the nose, or we have from one man to the other, that is removing a portion of the septum of one patient and implanting it into submucous flap, as the Doctor mentioned, in another patient, and thirdly, transplantation of animal to man (heteroplasty). Now, heteroplasty is absolutely unsuitable, and has not proved successful, except with one or two men who have experimented on very young pigs in transplantation of tissue, and they have adhered, but usually they waste away. Lexer's work shows, for instance, in his great experiment of transplanting the entire knee from one patient to a tuberculous patient, uniting vessels, nerves, etc.; he would have perfect result if he could get vessels to unite. Perhaps they would not absorb. My experience is that these things usually become absorbed. I have tried the experiment of transplanting cartilage in the septum and it always became absorbed. The bone transplanted from the tibia to the nose subsequently became absorbed, although it takes longer to do that.

The point that the Doctor brings out in his paper, the difficulty of transplanting tissue in the inferior turbinate, is this, that the pathology of an atrophic rhinitis shows the absence of functioning tissue. There is an excess of epithelium. Cautery of the surface does not destroy the excessive epithelium. That is part of the pathology of atrophic rhinitis. That is the only way you can differentiate from the atrophy following removal by operation. In all cases of atrophic rhinitis there is probably an associated and secondary sinusitis, but that is not the point in discussion. You would have to scale off the entire mucous before you could get other tissue to adhere to that, and that is the great difficulty in the union, that these parts do not adhere.

Dr. Barnhill relates the point which I have followed out. There is no reason why cartilage should not adhere to bone, but it does not. It is the same kind of structure embriologically.

If the Doctor will try this experiment in transplanting the bone in atrophic rhinitis, do a submucous resection of the cartilage, and then plant in the bone and cover again with mucoperichrondrium, he will find that the tissue will adhere and will remain longer than if he plants it against the cartilage or bone. The perichrondrium from the opposite side will offer a greater chance of adhesion than bone and cartilage. The implantation of mucous membrane, I would certainly criticise; not only that it would absorb, but there are glands which will secrete and make points of irritation, and it is entirely out of the accepted views on the surgical pathology.

Dr. Scholz: While working under Dozent, Dr. Hajek, in Vienna, about the year of 1907, had a small amount of experience with cases of this kind. The Docent, together with those assisting him, Drs. Williminski, Hirsch and myself, in a dozen or more cases, transplanted bone and cartilage from one patient to another. All of the cases thus operated upon were cases of atrophic rhinitis in one stage or another. The method used on most of these was to introduce into the pocket made by dissecting up the mucous membrane with the underlying perichrondrium and periosteum, pieces of septal cartilage and bone de-

rived from another patient, on whom a submucous resection had been done, or septal spurs. In a few cases, Dr. Williminski and myself attempted to transplant turbinal tissue on turbinal tissue by tamponing or suturing the graft. I wish to say that according to my recollection, the procedure failed in every instance. In a few in the beginning it appeared that union was taking place, but not long thereafter the transplanted part would be thrown off, or it would be found necessary to remove the same from the pocket. In this work it appeared that cartilage tissue was more suitable than other tissues, at least it remained in place longest. In answering Dr. Iglauer's question I wish to say that I am not aware of any publication of the work done at this time.

Dr. Goldstein: I would like to suggest that the keynote to the whole situation of transplantation is nutrition, and that if Dr. Iglauer finds it possible in his further experimentation, where the transplanted area and the tissue to be transplanted are in close association, for example, if he, as in one of the cases reported, has an area one-fourth or one-half inch in diameter, and he can get the mucous membrane of the turbinal and leave a tag of the turbinal on its original attachment, so that the vascular supply can be maintained, that that type of transplantation will be more effective than where the tissue is stripped either from the same patient or from another, or in a heterogenous way. Also, if he takes a turbinate that is atrophic, a lower turbinate, and attempts transplantation from a middle turbinate, if he will make his transplantation and leave enough intact to maintain the vascular supply he will get better results than where it is entirely stripped.

Dr. Iglauer: It is hard to determine where to begin this discussion.

First, as regards Dr. Goldstein's suggestion that transplanted tissues will thrive best where there is the most nutrition, that, of course, is apparent. Tissues are more apt to survive where there is the best blood supply, but we have in the vascular nasal cavities ideal conditions for nutrition (as all of us know who operated in the nose before we had adrenalin.)

Dr. Barnhill brings up the question of the contact of dissimilar tissues. That is no real objection. You can take a piece of cartilage, transplant it under the skin, and it will grow there. The operation has been done. The mere fact that you put bone in contact with cartilage is no objection. You can get adhesions and blood supply to pass from the cartilage to the bone, and these submucous plants on the septum are not only in contact with cartilage, but also with bone, so that you put the bone in contact with the septal bone.

Dr. Levy brought up the question as to etiology of atrophic rhinitis. We cannot go into that here. I don't think we know what the etiology is, but the question is raised, is there enough blood supply in an atrophic rhinitis nose to supply the transplanted tissue. I think there is sufficient blood supply. If we suppose that atrophic rhinitis is a nutritional disturbance, due to some condition of the central nervous system, there is no reason why the transplanted tissue should be affected by the central nervous system of the recipient. In other words, there is no valid objection to the transplantation of tissues into the affected nose.

Dr. Ballenger questions the diagnosis in one case. He brings up the problem suggested by Gruenwald so many years ago; i. e., is atrophic rhinitis a disease per se; or is it secondary to sinus disease? In this particular case, I could not make out any sinus trouble, and in my experience, and I think the general experience, atrophic rhinitis usually begins in the inferior turbinate. The inferior turbinate may atrophy to a considerable extent with the middle turbinate still normal, or even thickened. In atrophic rhinitis the middle turbinate is nearly always involved some time after the inferior turbinate shows marked changes.

I think the doctor is mistaken in thinking cartilage would undergo rapid absorption. Experiments show that it is one of the best tissues to transplant. It behaves well when transplanted. The cells seem to proliferate. It behaves much better than bone. The gentlemen who point out the advantage of transplanting cartilage are, perhaps, correct; it would probably be better, but is more difficult to obtain this tissue.

Dr. Beck brings up the question of heteroplasty. I didn't take that up, because when you transplant tissues from one species to another, it really becomes implantation, just as if you put in a foreign body, a piece of metal, for example. Experiments show that heteroplasty will fail. Animals must be closely related in species or blood to get the best results.

Dr. Beck has referred to Lexer's remarkable case of the transplantation of a knee-joint. That knee-joint functionated for a while, but I heard from one of my orthopedic friends that after some years it became stiff and one who examined it lately thinks it is not much good.

It is generally agreed that transplanted bone does not survive as bone. By that I mean that the bone which is transplanted becomes absorbed, but the framework of that bone, especially periosteum and medulla, serves as a skeleton on which new bone may be regenerated, so if you do transplant a piece of bone you may eventually get a new piece of bone of the size and shape of the transplant.

Dr. Iglauer: As far as I know, there have been no publications from Hajek's Clinic. The doctor states his tissues all sloughed away, whether he put them on the surface of the mucous membrane or into pockets. What do you mean by sloughing? That they came out? Well, you have to be rather aseptic in this work. It is my experience that the submucous transplants do not slough. I regret to state that in my opinion in the course of time, the tissues are absorbed. In the case which I was able to follow for over a year, the transplant was gradually absorbed, but in none of the submucous cases did I get any suppuration. You form a pocket, put in the transplant and close the pocket. If you transplant on the surface, I think it is very likely to slough, especially in animals. The one question in my mind is not whether you can transplant, it is whether the transplant will maintain its original size or be absorbed.

Some of the gentlemen criticised me for putting mucous membrane under mucous membrane. A perusal of my paper will show that this was done more or less as a temporary procedure. I placed the mucous membrane under the mucous membrane to get the transplant to hold, and then I proposed (and carried out in several cases) to lift the mucous membrane of the recipient at some later time and thus expose the tissue which had been transplanted. An examination of the specimen from the dog shows the transplanted mucous membrane in excellent condition under the mucosa, and if I had done the second operation on this animal and had removed the overlying mucous, the transplant might have functionated.

THE DIFFERENTIAL DIAGNOSIS BETWEEN VINCENT'S ANGINA AND PRIMARY SYPHILITIC LESION OF THE TONSIL.

By DR. ROBERT LEVY, Denver, Colo.

A young man, 24 years of age, was taken sick with the usual symptoms of sore throat, both general and local. Being subject to attacks of this kind at least once a year he thought nothing of his condition until he began to have great pain upon swallowing, with some swelling of the neck. He called in his family physician, who pronounced his a case of quinsy involving both sides. The swollen tissues were incised and shortly after there was a sudden discharge of a small cupful of bloody pus, which, however, did not give the expected relief.

Between two and three weeks after the onset the swelling in the neck became more marked, and one week after the supposed abscess broke, I was called to see the case. I found the patient weak, somewhat emaciated, suffering considerable pain, more marked upon swallowing, a slightly increased temperature and moderately rapid pulse. The examination of the throat revealed a bilateral swelling of the tonsillar and peritonsillar structures. There seemed to be comparatively little difference in the two sides. Upon the surface of the swollen tonsils a tenacious, gray exudate could be seen uniformly distributed. To the touch the tumefaction seemed to be harder upon the left than on the right side and upon this side also the cervical adenitis was more pronounced. No local or general treatment was of any avail. Within one week the swelling upon the right side had subsided but upon the left there developed a distinct ulcero-membranous lesion with dirty, greenish-gray exudate which was readily removed, leaving a bleeding surface. The surrounding margins were elevated and moderately hard.

Vincent's angina appeared to be the clinical diagnosis. Bacteriological examination of the exudate as well as of the serum from the surface obtained by curetting revealed the presence of numerous fusiform bacilli and what was apparently a typical Vincent spirochete but failed to disclose the spirocheta pallida. More vigorous local treatment such as is recommended in Vin-

cent's angina was instituted and still the patient made very unsatisfactory progress. Two subsequent examinations for spirocheta pallida were made, both of which were negative.

At the end of six weeks from the onset of the affection, secondary skin lesions manifested themselves and a Wassermann reaction was now positive. One injection of salvarsan cleared up the local lesion and the subsequent history of the case confirmed the diagnosis of chancre of the tonsil. The mode of infection was traced to a drinking cup which was used in a shop as common property. It was discovered that in this shop one of the employees had a syphilitic sore throat.

This case is cited as an illustration of the difficulty in differentiating two lesions, both of which are by many considered rather rare, but which, upon a study of the literature, will be found to be not uncommon. Vincent's angina as an entity is becoming more frequent as our attention is called to it and as our methods of recognizing it are becoming more positive, and although for several years after its description by Plaut, in 1894, and Vincent, in 1896, few cases were recorded, recent literature has placed so many of these cases before us that it is no longer the subject of special comment.

Chancre of the tonsil is also less uncommon than generally believed. By many authorities it is held to be the most frequent of all extra-genital primary lesions. Several other cases occurring in my own practice and reported by others have caused much discussion as to the possibility of differentiating these two lesions in their early manifestation. In the case related above, the diagnosis of Vincent's angina was borne out by clinical and bacteriological findings, but the subsequent history of the case proved it to be one of syphilis. On the other hand, a most interesting case is reported by Zinsser, in which he states that when the patient "came under observation the lesion was a characteristic chancre of the tonsil but proved to be one of non-specific ulcer belonging to the Plaut-Vincent group." The difficulty is further increased by a similarity in the spirilli in the two conditions, by the fact that salvarsan has been shown by Gerber to be destructive of other spirochetes besides those of syphilis and by the healing of a case of Vincent's angina by this method.

What is the typical appearance of Vincent's angina? I believe it is impossible to state this, in that it may manifest itself in a mild or a severe form. The appearance, generally speaking, is that of a dirty ulceration, irregular in outline, having a hard,

everted edge, and with a tendency to spread deeply rather than superficially. The surface of the ulceration is covered with a grayish-green pultaceous deposit and is readily wiped off, leaving a bleeding surface beneath.

What is the typical appearance of chancre of the tonsil? It is also impossible to answer this definitely. Generally speaking, it presents the appearance of a dirty ulceration surrounded by a zone of indurated tissue, the edges everted and the exudate upon its surface dirty and pultaceous, leaving a bleeding surface beneath. The similarity in the local appearances is further found in the general and local symptoms. In both lesions the pain may be slight or severe. In both the constitutional symptoms may be mild or marked by slight rise of temperature, general malaise and slight, though gradually increasing malnutrition. The glandular involvement is found in both, presenting itself sometimes early and sometimes after several weeks. As far, therefore, as local appearances and general or local subjective symptoms are concerned, the diagnosis cannot be positively made.

Of what help will the history of the case be? Very little, if any, in the majority of cases. Chancre of the tonsil is acquired either innocently through drinking utensils and the like or as the result of perverse sexual practices. In the first instance the patient is unaware of having acquired the infection and consequently cannot aid the investigation, and in the second instance, knowing the possibility of acquiring an infection he will not admit the bestial practice and so will not aid the investigation.

We therefore look with hope to the result of bacteriological research and what problems have we here to confuse us? In the case of chancre we expect to find the spirocheta pallida, but although this micro-organism when found, is positive identification of the disease, it has been shown that it may be recovered almost invariably from glands *secondarily* involved but that rarely is it found in the early stage of the tonsilar lesion. In a series of investigations to determine if it be possible to recover the spirocheta pallida from the tonsils, Campbell found it possible in 80 per cent. to 90 per cent. of untreated cases with secondary lesions, but did not find it in his *primary* cases. One should not be misled by the discovery of the spirocheta dentium which is very frequently found in the mouth and is the one spirocheta which is more likely than any other to be mistaken for the pallida.

The spirillum of Vincent which is associated with the fusiform bacillus in Vincent's angina is somewhat more easily distinguished but nevertheless, as stated by Zinsser, the differential diagnosis of spirocheta of the mouth requires the greatest caution because of their close resemblance to one another. Moreover, it has been shown that the characteristic Plaut-Vincent micro-organisms are present as innocuous saprophytes in many mouths, and especially in those in which there are carious teeth. Their favorite location seems to be around the gums and in the tonsils.

How then can bacteriological examination aid us? Only partially and indefinitely. Positive or negative results of microscopic investigation offer nothing reliable or pathognomonic except in the one instance, namely, the finding of undoubted spirocheta pallida in a local lesion having the suspicious appearance of chancre. A certain amount of reliance may be placed upon the finding of the Plaut-Vincent micro-organisms in abundance. It is true that the spirocheta and the fusiform bacillus in symbiosis must be present in order to establish the diagnosis of Vincent's angina, and it is also true that they must be found in large numbers and almost to the entire exclusion of other micro-organisms. Such finding gives us decided assistance.

How then can the diagnosis be made? In the light of our present knowledge and with the exceptions mentioned above, a positive diagnosis cannot be made. We may form a tentative opinion as to the most likely nature of the lesion, but during its early stages we should give a very guarded opinion. The progress of the case will be our most valuable guide. Vincent's angina is often a self-limited affection and is generally amenable to local treatment. Primary syphilitic lesion may also be self-limited, but in time, secondary lesions will manifest themselves. These should be carefully watched for in every case, even after the local lesion has healed. One should, therefore, look upon every ulcero-membranous lesion of the tonsil with suspicion, reserving his judgment until the progress of the case establishes the diagnosis.

DISCUSSION.

Dr. Stein: This case, as reported by Dr. Levy, is unusually interesting. Usually the difficulty of diagnosis by a bacteriological examination will necessitate the consideration of another disease. I refer to a case that I reported about a year ago before a Section of this Society. A case of lymphosarcoma of the tonsil. It is germane to this subject because clinically it appears to be very similar to a Vincent's angina. The case that I reported at that time was considered

at first as one of Vincent's angina, on account of the characteristic ulceration and destruction on the tonsil, and particularly because the ulceration tended toward self-healing, as in many of these cases of Vincent's angina. We find nothing definite, of course, in the bacteriology of lymphosarcoma, any more than we have in these two atypical cases mentioned in the paper, and therefore it appears to me that lymphosarcoma might be taken into consideration in the diagnosis of conditions similar to the two conditions mentioned by the essayist.

Dr. Iglauer: It seems to me that in every case of sore throat in which I suspected Vincent's angina, a smear from the ulcer always showed the bacillus and the spirillum of Vincent. In other words, if anything led me to believe it was an ulcer due to Vincent's organisms, and I made a smear, I always confirmed the diagnosis, and that happened seven or eight times. Now, given an ulcer in the throat, in which you find the two micro-organisms, I would like to ask the essayist if he would not be justified in making a diagnosis of Vincent's angina, or would he say that you might have a chancre of the tonsil with these two micro-organisms present. If you find but one of the organisms present, difficulties arise in the diagnosis; but if you have an ulcer with these two micro-organisms present, would you not be justified in making the diagnosis? It is very easy to find the spirillum of Vincent's angina in the hanging drop, and I tried to prove that this was the specific cause of the ulcer by making a hanging drop and putting some of the patient's serum into the hanging drop in the attempt to get an agglutination. I have not carried these experiments very far, but I did not get the agglutination. It is very pretty to see the spirillum under the microscope. The spirillum of syphilis, I think very hard to see, but the spirillum of Vincent is very easy to find, so I don't believe the diagnosis is as hard to make as the essayist thinks.

Dr. Beck: I look upon this interesting case from a different point of view. To me, it appears as a time for action, not to wait. If it is a primary chancre, that is, if it looks as if it might be a chancre, and since the destructive process is going on, of modern diagnosis or since the destructive process is going on, or rather invasion of system, so rapidly, why, it is in the light of modern diagnosis or therapy, to attempt prevention of progress of disease. I have reference to syphilis. I would say that this patient, no matter if he has Wasserman positive or negative, should have a prophylactic dose of salvarsan, for that will also have, as has been shown, a good result on Vincent's angina. That is what I would do, and look for the diagnosis to clear up or not, but make the patient safe.

How about the experiment on animals in this case? Couldn't Dr. Levy have secured a monkey out in Colorado and made an inoculation in the anterior chamber of the eye? I make that point, not as anything practically, but simply from a theoretical experimental standpoint.

Dr. Levy: The interest attached to this subject is, I think, pretty general. I received a letter just before leaving home from our friend Leland in Boston, who said that he had been having a discussion there on these same lines, and that he hoped I would be able to clear it up. I regret to say that my paper seems to leave us more in doubt than before I read it.

In regard to Dr. Iglauer's suggestion or question as to the possibility of finding Vincent's angina in all cases in which microorganisms are present, I would say that these must be present in great number and to the exclusion of other microorganisms. We find that these occur in normal throats. On the other hand, there is no reason to believe that the patient may not have both affections. He may have Vincent's angina and chancre of the tonsil. The point is; Vincent's angina may get well, chancre of the tonsil may get well. The patient not being carefully watched, there may be no suspicions, the patient goes on, does

not develop secondary symptoms, but later, a year or two years, he has symptoms, and we wonder as to diagnosis. Some one else gets the case, and diagnosis is still in doubt.

As to injection of salvarsan in cases in which we are in doubt, I think it is in line with the old injunction that was given so many years ago, in cases of doubtful primary sore it is poor policy to institute antiluetic treatment. We are always in doubt thereafter. One dose of salvarsan does not cure, as I think Dr. Beck will admit; it only masks the subsequent course.

DIAPHRAGMATIC CLOSURE OF THE ESOPHAGUS.

By OTTO J. STEIN, M. D., Chicago, Ill.

One of the most interesting of my esophageal cases was one in which there was virtually a complete closure of the tube by a diaphragm-like membrane.

It is not uncommon to meet with partial or even complete closure of the esophagus from neoplasms of various character, either residing within the walls of the tube and invading its lumen or growing outside the tube but encroaching upon it. Also from embedded foreign bodies, certain localized inflammatory lesions, diverticuli and spasms. But the occurrence of webs or diaphragm-like membranes spreading directly across the lumen of the tube are looked upon as yet as pathological rarities. There is no doubt but what they will be more plentifully found as the use of the esophagoscope becomes a method of routine examination in all obstructing cases. This leads me to say that without such an instrument as an esophagoscope strictures of this character can scarcely be diagnosed satisfactorily, and in most cases can not be treated successfully. The history of the case I have to report is as follows: The patient, a young Italian, 26 years of age, complained of inability to swallow food and of great weakness and emaciation. The difficulty in swallowing was first noticed seven months prior to my seeing him. It appeared gradually and was not attended with any pain or other symptoms. As the difficulty in getting food into his stomach became more pronounced he naturally suffered from insufficient nourishment and he soon became emaciated so that he weighed less than 90 pounds. He was taken from Chicago to New York, and there not finding the relief desired he was taken to his home in Italy. There also, apparently, he was not benefitted, for he was soon brought back to America and was finally referred to one of Chicago's surgeons for operation. It was then that I was asked to see him in consultation with his physician, Dr. Meyer.

The patient at all times when seen by me was extremely nervous and apprehensive, and so were his numerous friends, for at no time did he present himself for the subsequent treatments without the attendance of from six to sixteen co-patriots, who refused absolutely to leave his side. This show of physical support was

not an audience to inspire calm or confidence in the operator, especially after having been informed that they belonged to a black-hand organization. Nevertheless the treatment of the case was interesting enough to pursue even in the face of the threatening attitude of the onlookers.

The patient was very thin and weak and could not stand any long examination or treatment. No solids of any kind had passed into his stomach for months. Up to recently milk and water would at times pass through, but only after considerable time and delay, and then only in very small quantities. As a rule most of it was expelled by the esophagus after passing "just so far."

As far as inquiry went no acknowledgement of syphilis was forthcoming. Nevertheless his physician gave him increasing doses of kali. iod. after I had opened up a passage way to the stomach. The patient gave a history of having received a bullet from a pistol in his right side some time prior to the appearance of stricture symptoms. The right hip showed several large scars where he had been operated, but the bullet was never found.

Under local anesthesia the second largest of the Bruening esophageal tubes was passed. At 20 cm. some difficulty was experienced in getting the tube by what appeared to be soft thickening on the left wall. I probed about this region thinking I might possibly feel the undiscovered bullet, but nothing was found. The scope then passed readily onward, mouthing the esophagus characteristically as it advanced, until it entered a well, as it seemed, full of liquids. This was sucked and mopped out, and I could now readily see the end of the scope arrested at 37 cm. by a smooth glistening membrane. Pressure and manipulation permitted no further advance, neither did it reveal an opening. A day later the tube was passed as before to 37 cm., its progress being checked as before by a dense glistening-like membrane. With the aid of a probe a search was made for an opening, and shortly a minute hole was found toward the left and posterior. Without the scope it does not seem possible to have found this opening. Several very excellent skiagraphs had been taken, which I here present to you for inspection, that show the pouching above the stricture.

At the third sitting I succeeded after some difficulty in introducing the point of a dilator through the minute opening and tearing sufficiently to permit the passage of the smallest Plummer olive sound. At each succeeding treatment I passed the next of

the various size olives up to the fifth. I was now using the largest Bruening esophageal tube. A vigorous pulsation of the aorta could be seen as the end of the tube presented itself just above the stricture. On pressure with the end of the tube against the membrane the pulsations were no further seen. As the olive passed through the opening in the membrane it would do so with a sort of pop and then it could be distinguished in a free space immediately below and further progress was unhindered for the remaining 10 cm. to the stomach. With the Plummer double olive the same phenomenon presented. On its return the broad shoulder of the olive would advance easily up to the membrane and then it would require a greater degree of pull to get it through the opening than it took pressure to pass it down. In using the largest olive I almost thought I was about to invaginate the esophagus in my effort to get it through and out of the opening. Here again the practicability of the scope came in use. By pressing the instrument against the top of the olive it facilitated the latter's removal, thus lessening the danger of tearing or invaginating the walls.

Spasm of the esophagus above the stricture was a feature often present, but patience and gentle but firm and continued pressure overcame the obstacle every time.

For anesthesia at first 20%, but later 10% solution cocaine was used and then only in the lower pharynx. After passing the cricoid region I seldom found it necessary to use any anesthetic. After the passage of the first olive the patient ate heartily and within two months had regained 35 pounds of his lost weight.

It was with the greatest difficulty that he would return for his treatments, especially after his recovery, and consequently there was some narrowing again, but even then, after an absence of six weeks, the stricture region took a number three olive and at the second treatment I was using the fifth size again. It has been advised to excise such membranes, but to me it has seemed that the likelihoood of scar tissue formation with subsequent contraction was too great to warrant its performance unless under most favorable conditions. I believe that if dilatation is carried out at intervals sufficient to provide against the reformation of the membrane that eventually the tag ends of the torn and stretched membrane will disappear for good, leaving a patent and unobstructed tube.

DISCUSSION.

Dr. Goldstein: I would like to ask Dr. Stein if it is possible that that was a rather large diverticulum, a thickened lip, leaning over the side that was not obstructed by the diverticulum. Could you find through your esophagoscope whether that was all around?

Dr. Stein: It was attached all around. The passing of the olive showed that distinctly by the pop when it came through. It would hold the olive tight, but when through it was perfectly free underneath.

Dr. Iglauer: I have a case to report which may throw some light on the origin of this web in the esophagus. A coal heaver was admitted to the Cincinnati Hospital, stating that he had always been well up to the time of his admission, but that two days before he had taken a very hearty meal after putting in a load of coal, and the meal suddenly stopped in its downward passage and he had since been unable to swallow. The patient was given bismuth by mouth, and the X-ray showed that there was a column of bismuth which terminated just about as it did in Dr. Stein's picture, at about the same point, and just below this was a plug which the radiologist said was a column of food. In other words, the man had a plug of food just above the diaphragm and the rest of the esophagus was filled with bismuth. At the point where these two plugs came together there was an annular constriction. On further examination of the patient, I noticed that he had on his tongue a very deep ragged ulcer, about one-half inch long. I made a tentative diagnosis of gumma of the tongue and asked Dr. Ravogli, the syphilologist, to look at it and he agreed in the diagnosis.

The night before patient was to be examined with the esophagoscope, I instructed the interne to wash out the esophagus in order to get rid of the bismuth. The next morning the patient stated that he had felt something let go and heard it drop into his stomach (that was rather an exaggeration). After this he could swallow. Nevertheless, I passed the tube, and at the point of constriction I found an ulcer resembling in every way the one on his tongue, i. e., a longitudinal ulcer on one wall of the esophagus. The diagnosis, then, was gumma of the esophagus, the obstruction was probably due to a spasm excited by food coming in contact with the ulcer. We then had a Wasserman made which proved to be positive and the patient was given salvarsan. He left the hospital, promising to return, but I have never seen him since.

Dr. Beck: From the diagnostic point of view, I have not had anything similar to this case, but I was reminded of making a diagnosis from the tissue that this diaphragm was made up of. Recently I had the pleasure of visiting Rochester and I saw some work done on the esophagus by Dr. Plummer, and some tissue removed by the aid of the esophagoscope which was histologically examined and diagnosis made of early stage of carcinoma of esophagus. In this, the picture looked like a non-malignant or ordinary inflammatory stricture. This was the earliest possible diagnosis (of course, that does not add anything in the way of treatment), of that particular case I am referring to. In Dr. Stein's case it might have been possible to make a diagnosis as to whether this was scar tissue or other tissue.

I would like to say one more thing; that in using bismuth as a food in an older man, we ought not to forget that a calcareous aorta may cast a big shadow as the bismuth and hide or rather distort the picture of that which might be there and you may possibly think the shadow of bismuth goes further down than it does.

Dr. Stein: The etiology of this membrane is obscure, as it is, I think, in all similar cases that have been reported. We are still in the dark as to what was the origin of it, but having received an injury aroused the suspicion that that might have had something to do with

it, although this could not be demonstrated. In ulceration of the esophagus you can see the ulcer, and the spasms that are frequently associated with it have to be taken into consideration. In this patient the esophagus was normal all the way down to the stenosis, and when we came down to the web there was found a large well or pouch containing liquid food. The obstructing membrane was smooth and glistening with no evidence of ulcer or thickening around the walls, no indications or suspicion of extra or intra mural growth. I would like to emphasize the necessity of using large size tubes in the diagnosis. After having passed the dilator and tearing the web you could see the tear and the tags of membrane and it made it very clear that it was a membrane. Immediately upon passing the smallest olive you could hear it pop through. After passing through this web-like membrane, there was no further obstruction, but on the return, when you bring up the olive, it comes easily up to the membrane, then it is caught and you have difficulty in getting through unless you pass the esophagoscope down to it. I would like to put emphasis on these points. This procedure is much to be preferred to passing the olives blindly, probably getting the instrument caught, doing a great deal of damage in getting it out.

These conditions (if it is a membranous web—I cannot think of anything else it could be) are so extremely rare that I think every one should be reported so that we may finally get at the real cause.

A METHOD FOR MEDICATING THE DEEPER RECESSES OF THE NOSE AND EAR.

By FRANK L. STILLMAN, M. D., Columbus, Ohio.

The method of treatment I bring before you, is a combination and an extension of two well known methods of treatment, viz.: the use of suction, and the use of a medicated nebula under pressure. For carrying out the treatment, it is necessary to have a special apparatus, which will be described below.

The benefit of suction in purulent diseases of the nose and middle ear is primarily supposed to be from pumping out retained secretions, especially from regions which the ordinary methods of cleansing, such as the douche or spray, will not reach. Since Bier made his studies in vacuum treatment of diseases, it is understood that the use of a partial vacuum helps these purulent cases also by the passive hyperemia produced. If that fact is accepted, the field of usefulness of suction is not limited to purulent diseases of the nose and ear, but may include inflammations without pus formation as well.

The application of medication by nebulization is more effective and inclusive than by painting, douche, or spray, as, owing to the fine division and the good suspension of the medicament in the menstruum, it tends to float into cavities and crevices that heavier particles would not reach. By forcing in this nebula in greater volume, or by closing up the exits for its escape, it penetrates still more deeply. Theoretically this method of treatment would be ideal for forcing finely divided medicines into the deeper recesses of the nose and ear, if one did not remember that co-incident with its use air compression takes place in the cells, thus preventing the nebula from reaching their depths.

Inflammatory affections of the accessory cavities of the nose or ear, are, in practice, often found to be perpetuated by bad drainage. But the use of vaccines and serums, and means to improve the patient's power of resistance, have shown that bad drainage alone cannot be blamed for the perpetuation of the various phases of accessory cavity inflammation. Many persons have obstructed drainage channels in the nose and ear, and still have no inflammatory affections of the accessory cavities. In addition, there are other elements that have to be taken into con-

sideration. These are the presence of pathogenic bacteria and a susceptible soil. If bactericidal applications could be made to the surface of all tissues involved, some cases would get well without operative interference, many acute cases would get well which might otherwise have become chronic, and some operated cases would end in complete, rather than in partial, cure. Various antiseptics, used in the nebula of a multiple nebulizer, have been used in the nose by the method of Politzer for middle ear inflation, the pressure of the air-tank through the nebulizer being used instead of the hand bulb. An air pressure of 5 or 10 pounds will bring this antiseptic nebula into the accessory cells to a certain extent. If approach to the cells has been made freer by previous cleansing and shrinking of the swollen soft parts, the nebula will go into the cells until held back by the condensation of the contained air in the cells. The stronger the pressure of the incoming nebula, the further it goes into the recesses, but as it is not wise to increase the pressure of the nebula to more than 10 or 15 pounds to the square inch, there will in the flask-like cells be a pad or layer of compressed air, which prevents the nebula from coming in contact with their distal walls.

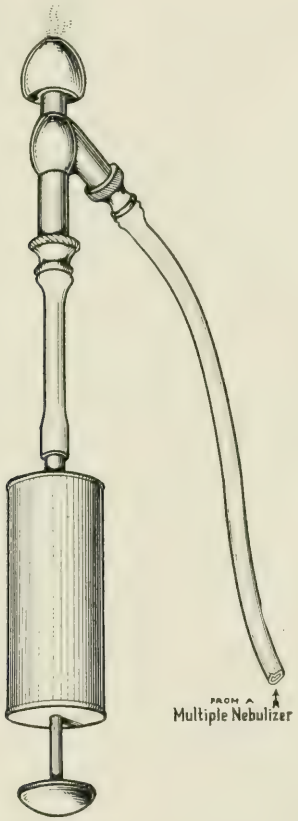
Please remember that pad of compressed air. That is what limits the efficacy of the usual local treatment, and the elimination of that pad is the gist of the new method of treatment I bring before you.

Many of you no doubt have used a routine treatment something like this—a douche, shrinking of the parts, suction, cleansing, forcing in antiseptics through the medium of a nebula under pressure. This is a good routine to follow in acute cases, and can—supplemented by other measures—be used in chronic cases. No doubt the results would be still more effective, if the compressed air in the cells didn't prevent the medication from getting in deeply.

Now by means of the little apparatus I show you, the medicated nebula rushes into the depths of the cells while the air pressure is still negative, and before the outer air gains ingress. The suction syringe is connected by hose to a straight metal tube three inches long. On its distal end fits an acorn-shaped tip, containing a tubular channel from tip to base. Tips of different sizes and shapes may be provided for use in the nose, external meatus, and eustachian catheter. As near as possible to the metal tube's distal end is a hollow nipple for attaching the rubber hose from the multiple nebulizer. The nipple forms an obtuse

angle with the distal portion of the metal connection. The pressure the hose is delivering from the nebulizer should be shown by a gauge.

The action of the apparatus is as follows when used for nasal treatment: The acorn tip is tightly fitted into the opening of a nostril. The patient holds this in place with one hand, and closes the other nostril by pressing on the ala with a finger of the other



hand. The nebula is started at the desired pressure. The operator's left hand holds the suction syringe. The vapor is allowed to run for a short time, then the patient is requested to approximate his palate to the pharyngeal wall by one of the usual expedients used for this purpose. The operator pulls the syringe piston and exhausts the air, at the same moment pressing the nebula hose with a finger flat against the barrel of the syringe. The

amount of pull on the piston necessary to overcome air pressure resistance will show when the desired amount of vacuum has been obtained in the nasal cavity, and at that moment the finger compressing the flexible hose is lifted, and the nebula rushes in to restore the pressure equilibrium. This could all be accomplished automatically by using a vacuum generator instead of a syringe, by adding a sliding valve to let in the nebula at the right moment, and a set safety valve connected with the flexible hose coming from the nebulizer, to prevent accumulating pressure of the nebula bursting the hose—but for my own use I prefer the simpler apparatus.

It is not desirable that this treatment should displace other treatments now in vogue, but rather supplement them. For instance, flushing out cavities through accessible ducts by means of a catheter will scientifically get at the seat of the trouble, but most of the nasal sinuses have inaccessible ducts, and the mastoid antrum and other recesses connected with the middle ear, are also inaccessible to ordinary procedures. I have treated cases of chronic purulency of the middle ear by this method, using a nebula rather strongly charged with iodine or argyrol, with seemingly better results than obtained by the usual non-surgical treatments. Acute coryza seems to be curtailed by this treatment also. For several months I have used it as a part of the treatment in cases which seemed theoretically suitable for its use, and have come to the conclusion that it has practical value.

A patient's suggestion greatly aided me in solving the mechanical problem involved in the construction of this apparatus, and to the satisfaction of both of us he got poetic justice and was apparently cured of a nasal discharge by taking the treatment himself.

DISCUSSION.

Dr. Beck: I should like to ask the doctor whether he ever got over-distention of the sinuses in the middle ear, especially in acute cases?

Dr. Stucky: I would like to ask Dr. Stillman if, for instance, when one side is involved, he can get a vapor of sufficient bactericidal property to destroy bacteria in that sinus, what would then be the effect of that vapor on the other sinus?

Dr. Ballenger: I think that Dr. Stucky's question is not relevant, being based on a wrong idea. We don't presume to introduce bactericidal medicine into the ear cavity, but we introduce something that will stimulate the circulation and increase the resistance of the tissue. It only renders the tissues more capable of resisting the development of germs.

Dr. Stillman: Dr. Beck asked is there was danger of producing over-inflation of the ear in using this apparatus. Of course, "the proof

of the pudding is in the eating thereof," and I have asked patients in reference to this. I have found that it causes a partial vacuum in the Eustachian tube that brings about a slight retraction of the drum membrane, very slight though, (I noticed this by inspection of the drum membrane at the time the little operation was done), but when the vapor comes in from the nebulizer and restores the pressure, and the finger pressure on the nostril is released, it seems only to restore the pressure of the air that has been taken out of the middle ear, instead of causing over-distention—in other words, it does not go in with enough volume to cause over-distention if the method as described is followed. That is the practical outcome.

In regard to Dr. Stucky's question, I won't try to answer the hypothetical question, because I have been in doubt as well as Dr. Stucky, but it seems to me still that a vapor that is not strong—five to ten per cent. of iodine preparation or five to ten per cent. of argyrol—will not hurt any normal sinus. I don't think it does any harm.

As for injuring the middle ear, causing an inflammatory trouble, I have used this apparatus about eight months, and have not seen anything of this sort. I am a little pessimistic in the use of these new apparatuses and remedies, but in this apparatus, simple as it is, I have been very agreeably surprised to have patients tell me that it has done them more good than any other treatment they had used. It has been without exception almost, and I am finally convinced by my own observations as well, that there must be considerable merit in the treatment.

REPORT OF AN UNUSUAL CASE OF MULTIPLE PAPILLOMA OF THE LARYNX, NECESSITATING TRACHEOTOMY AND THYROTOMY; AND TWO CASES OF FOREIGN BODY IN THE LOWER TRACHEA.

By J. A. STUCKY, M. D., Lexington, Ky.

My reason for reporting the following cases at this meeting is because they are of unusual interest. Four months ago a boy, fourteen years of age, was brought to me from the mountains; he was led into my office in a most anemic and pitiable condition, not only anemic, but cyanotic, scarcely able to walk without being supported, breathing was both difficult and labored, with a history of labored respiration, increasing in severity for some months past. I attempted to examine his larynx and found it practically impossible for the moment. The effort to hold down the tongue made breathing so difficult that it was discontinued until I had used a weak adrenalin and cocaine solution sprayed into the lower pharynx. The effect of this enabled me to get a glimpse of the upper part of the larynx, where I saw a large growth, having the appearance of a cauliflower, which I diagnosed as multiple papilloma. He was sent to the hospital, and I attempted to use the direct method of Jackson for the purpose of removing the growth; with the first inhalation of chloroform respiration ceased. He was placed immediately upon the operating table, and, after lowering his head and resorting to artificial respiration, respiration was resumed, though greatly labored. I used the Jackson tube, and removed a large piece of the growth with the forceps, and to my surprise found more presented to the view than I had already removed. Respiration now ceased entirely, on account of blood getting into the larynx. I could not see the vocal chords at all. The growth seemed to involve the whole of the left side of the larynx, except a narrow space on the right side where the air was passing through. I did a low tracheotomy, and resorted to the direct method again. After removing a portion of the growth the size of the first joint of my little finger, I found the remainder attached to the vocal cord, and involving the tissue beneath the cord. The removal of the mass through the tube was impossible, so a tracheotomy tube was introduced and the patient was put to bed. Forty-eight

hours later I did a thyrotomy. The microscopical examination of the growth was negative. A positive diagnosis of malignancy was not made from the specimen, though clinically it gave evidence of being so.

I opened the thyroid in the usual way and found that the left half of the thyroid cartilage was involved in the growth, necessitating removal of that half. The remaining edge of the cartilage was stitched to the skin, and a tracheotomy tube was inserted and allowed to remain four days, when it was removed. The boy was doing well, and at the end of three weeks I allowed him to return home.

Six weeks after he left me he returned with a growth on the opposite side of the larynx. An immediate tracheotomy was necessary as soon as he was brought to the hospital on account of cyanosis from obstructed breathing, which was done by opening at the site of the old wound and introducing the tracheotomy tube. I asked Jackson of Pittsburgh to send me at once one of his T-shaped tracheotomy tubes. He advised me, before resorting to that, to use daily 25 per cent. of alcohol, applied directly to the larynx, increasing the strength 5 per cent. every other day until 80 or 90 per cent. strength was used. At the end of six weeks the boy was apparently well. While his left vocal cord is gone, he talks fairly well, and has gained seventeen and a half pounds in eleven weeks. I did not use the T tube, but put him under the treatment of his family physician, Dr. Letton, who continued the application of alcohol to the larynx every two or three days.

Cases No. II and III.—Foreign Body in Lower Trachea.

The second case is one of a foreign body in the lower part of the trachea, in a child four years old.

I received a hurried call from the hospital, at about 5 o'clock on the afternoon of ———, saying that a child had just been brought in from the mountains with a grain of corn in the windpipe and was in a dying condition; they did not think it was necessary for me to come to the hospital, that it was pulseless, practically dying. I told them to use oxygen and prepare for immediate operation. I hurried to the hospital and found things as I had been informed, but oxygen had caused a manifest improvement. The history was that a grain of corn had been inhaled two weeks previously. The child was ready for the operat-

ing table when I arrived. The instruments were also ready, and on examination with Jackson's tube I found the larynx edematous, necessitating the use of a smaller tube than Jackson had. Loss of time and attempts at direct intubation caused respiration to cease. Cutting down into the trachea and introducing the tube, it instantly filled with pus and mucus. I removed the tube quickly, and, after attempting to use artificial respiration, which was futile, I picked up this long narrow-bladed forceps (Fig. 1). I introduced it as far as it would go into the trachea towards the bifurcation, and by opening the blades dilated the trachea, at the same time my assistant forcibly compressed the ribs, when out came the grain of corn with at least a half ounce of mucopurulent secretion. Artificial respiration was continued for several minutes before respiration was re-established. I stitched the edges of the trachea to the skin and put in a tracheotomy tube

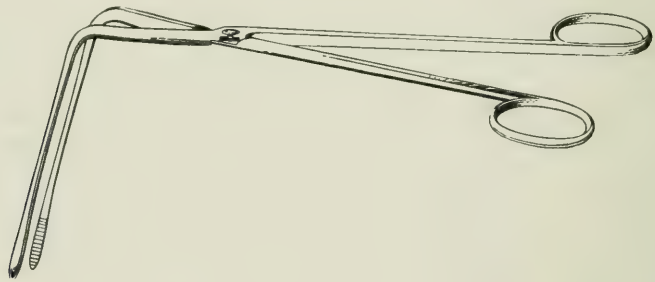


Figure 1.—The laryngeal forceps of Dr. J. A. Stucky. These forceps measure 5¼ inches in the horizontal shank and 2¾ inches in the vertical extremity beyond the elbow. The shank is rigid, the grasping vertical extremity is resilient and capable of firm fixation when the blades are closed. The serrated "bite" measures ⅛ inch transversely.

and left it eight hours and then removed the tube, kept the child by an open window (it had pneumonia in both lungs) and it made an uneventful recovery. Went home in three weeks perfectly well.

Case III.—Two weeks later I had the second child brought in from the mountains with a history of having inhaled a bean, an ordinary white bean, three days before. This child was cyanotic, both lungs blocked up and its accessory muscles pulling. An attempt to use the tracheoscope failed in this case on account of the edema of the larynx, etc., and I did a low tracheotomy and introduced the same forceps already referred to in previous case, in the same way, and while there was no gush of pus and mucus I got hold of the bean and it broke off. I simply split it, got part of

it out, and, standing the child on its head, holding its head downward and making a good many efforts, I failed to dislodge the other half, it sliding into the bronchus, according to evidence obtained by the stethoscope.

The child's condition was such that I thought further efforts with a longer tube would be dangerous, though I did try it without success. Trachea tube was inserted and the child was put to bed for forty-eight hours. At the end of this time I decided to make another attempt to relieve the obstruction of the bean in the left bronchus. On the way to the operating room, and just as the anesthetist began to give it chloroform, it had a violent coughing spell. I told him to remove the trachea tube, which he did. The child became very cyanotic, its trachea, larynx and pharynx filled up, but the choking was relieved when it swallowed, and that was the end of the trouble; it breathed nicely after that. I continued the anesthetic, entered the trachea with the tube, going down into the left bronchus, and I could see distinctly the imprint of that half bean, but I suppose the child coughed it up just as the anesthetic was begun.

The three points to emphasize in cases such as I have reported are:

1. None of these cases are hopeless. I have never in my experience attempted anything for more hopeless appearing cases than the latter two.

2. The use of the little, long narrow-bladed tracheal dilator. There is not enough strength in it to pick out anything that may offer resistance; it not only irritates the trachea, producing spasmodic coughing, but dilates it, and if the foreign body is moved the widest point of the instrument is at the proximal extremity of the blades, rendering egress easy.

3. I have learned in tracheotomies done by me in the last few years that I have been making a mistake in leaving the tracheal tube so long in the trachea. Stitch the trachea to the skin and do away with the traumatism caused by the tube working up and down and producing erosion of the trachea. The tube, in cases such as described, has accomplished the object intended in from eight to twenty-four hours.

4. The tracheal wound is more easily kept from obstruction by mucus, and kept cleaner with less danger to infection than with the tracheotomy tube. The stitches are removed at the end of twenty-four hours and wound allowed to close; this usually requires several days or more. The only dressing required is one

or two layers or sterile gauze kept over the wound, this to be changed as often as soiled by secretions from the trachea and lungs.

DISCUSSION.

Dr. Ballenger: These cases are not only interesting but are instructive. The first case of papilloma, multiple papilloma, reminds me of a very similar case, that of a child who was brought to me in an almost moribund condition. I made a hasty examination at the office and sent her to the hospital with the idea of doing tracheotomy to relieve the symptoms or prevent impending death. Before I could get to the hospital, the child was dead of asphyxiation.

This reminds me too, as brought out by Dr. Clark of Boston, that the indications in papilloma of the larynx in children are for operative interference for removal only when there is recession of growth, not when growing. Papilloma have a habit of growing and then not growing, the time to operate being during the period of recession. They should be left alone, during the period of activity. If you remove polypi during the period of active growth, as Dr. Stucky did in his case, they recur, not only at the original site, but in neighboring regions. In Dr. Stucky's case, it recurred on the opposite side, probably at a point of traumatism. On reflection, he would have done what I am going to suggest. As soon as he found that there was danger of suffocation, and knowing the growth still active, he would have done tracheotomy, and then would have waited until the period of recession and then removed the growth.

I had a case of foreign body in the larynx from the City of Mexico, giving history of four months' duration. This case had been diagnosed as diphtheria although there was no temperature. I was about to send him to the hospital for operation, when foreign body was coughed up at the hotel.

Dr. Barnhill: I have seen and treated several cases such as Dr. Stucky first reports. I am aware that what Dr. Ballenger says, namely that there are periods of recession in cases of papilloma, and hence the rule to operate during the time of quiescence. Within the past few months I have had two cases of papilloma, each with a history of a year and a half duration. Each child was only three years old. If there had been any recessional period at any time in either I was unable to learn the fact from the parents. There had been a progressive increase in difficulty of breathing, and when I saw these children each breathed so badly that it was my judgment that something must be done and done at once. It seemed to me unwise to follow any plan that required ether twice since when one has done the low tracheotomy a large part of the operation is already performed. In each of these cases that I am now reporting the thing that impressed me most when I opened the larynx and turned the cartilages aside, was, that there seemed no space there at all for breathing, so full was the larynx with the papilloma. Several physicians who were present made the remark that it seemed incredible that sufficient air could have passed through such a larynx to maintain life. It was my judgment that the papilloma could not have been successfully removed by any sort of upper or tube operation through the mouth, and hence in such aggravated cases the proper procedure is to follow Butlin's method of opening the larynx, cleaning out the papilloma surgically well, and then closing wound.

I am in accord with what Dr. Stucky has said as to the tracheotomy tube. It should not be left in long. Twenty-four hours is usually sufficient. I do not, however, agree with him that in all of these cases the trachea should be stitched to the skin, because then in healing, granulation tissue is apt to form in the wound that will give rise to more or less coughing as a subsequent annoyance.

Dr. Sauer: With reference to foreign bodies in the trachea or bronchi I think we ought to follow the rule laid down by Killion, i. e., to distinguish between hard and soft bodies. When we know it is a soft body, I think we should resort to low tracheotomy so as to save as much manipulation as possible. We know that in many instances the mere act of doing a tracheotomy the foreign body will often be expelled. I have had at least three cases of this kind.

Six or seven years ago, I reported a case of fibroma of the trachea. The growth was situated just at the bifurcation. The patient was a man seventy years of age. In passing the bronchoscope down through the wound, the patient suddenly became very cyanotic. To save his life, the tube was pushed down the trachea. The growth was cut off by the tube and expelled through the tube. I performed artificial respiration, and the patient recovered. Examination by our pathologists proved it to be simply fibroma. The patient lived three years and died of nephritis.

Dr. Levy: The lesson that I get from the report of cases such as Dr. Stucky's and others, in which rather extensive external laryngeal operations are done for the removal of papillomata is that: they are not as frequently indicated as many would believe, especially in children. Now, in children we do know that there is a spontaneous regression of papillomata. We don't always know when that period arrives, so far as the appearance of the patient is concerned, but we do know that we are perfectly safe with a tracheotomy tube in the child. When there is marked or slight dyspnea, a tracheotomy is all that is necessary in many instances. Do a tracheotomy and leave the case alone for a reasonable time. Not infrequently, as has been brought out by a Rosenberg of Berlin and many others, the growths have been increased by the function of the larynx. The larynx having been put at rest these growths disappear of themselves, the trachea is closed, and you avoid thyrotomy, disturbance of voice afterward and in very many cases the result is extremely bad.

In one case, I did an intubation. This put the larynx at rest. I don't believe it was the pressure of the tube that caused the recession of the papilloma, although that is said to be possible. The tube was retained for a considerable length of time and removed with perfectly satisfactory result. The child took a severe cold away from the city and was returned at the end of about a month with recurring dyspnea. Intubation was again performed, the tube being allowed to remain several months and then removed, and child never had any more trouble.

So far as the point made by Dr. Stucky concerning the retention of a tracheotomy tube is concerned, in the removal of foreign bodies by means of tracheotomy, I don't think it is necessary to leave the tube in any length of time. Do a tracheotomy, and, as Dr. Barnhill says, the child very frequently expels the foreign body by the act of coughing at the time that tracheotomy is done. You can close the wound, at once and the child is well.

Dr. Loeb: In the treatment of these multiple papilloma, I think it is fairly well recognized that if removed they should be removed entirely by radical methods as mentioned by Dr. Stucky.

In a case of mine, I suppose I happened to strike the period of cessation. At any rate, I attempted to remove the mass through a laryngoscopy tube and succeeded in removing a small portion and then the entire mass was removed, and patient recovered.

As for the other cases, I think Dr. Stucky was very fortunate in being able to grasp the bean and the corn at the proper moment and at the proper place. I don't think it is very good to rely on such a method. I compliment him on having his forceps there at the right time. These mountain people—they are difficult anyway.

Dr. Beck: There must be different types of papillomata, or different conditions existing in the individual, as one disappears and the other does not. I wish to relate a case that occurred in my practice ten years ago, following the publication of Clark, in which tracheotomy was advocated to put the larynx at rest. A little Italian child, two and a half years old, was brought to me with a mass of the papilloma of the larynx. I introduced a tracheotomy tube. In seven weeks, papilloma began rapidly to disappear. At the end of five months, I removed the tube and from that time on there was nothing to be seen except thickening of the laryngeal structures of the cord. Now, that patient I have seen every year, two or three times, and she is steadily better in voice with no recurrences of the papillomata.

Another case, exactly parallel, a little Jewish child, six years old, who had a large papilloma which I treated in the same way. After about a year of wearing the tube, there was no change in that papilloma, in fact it grew so that I was forced to do laryngotomy and remove growth, with very good result and no recurrence.

There are two cases, similar, excepting difference in age and nationality, which may have something to do with it, and they acted entirely different.

I have seen a few other cases of papilloma, and it seems as though that is the case all around, that they do not act alike, and I do not think we can lay down a law. Of course, the easiest way is to do a tracheotomy, wait and then do external operation.

I recall a case in which I had a little incandescent lamp in the right bronchus coughed out. I did a tracheotomy, letting the patient come partially out of the anesthetic, and tickling the mucosa of the trachea, patient coughed out the little incandescent lamp.

Dr. Goldstein: In regard to foreign bodies, I would like to recite a case that came under my observation a few months ago. The patient was a boy of ten. He was brought in from the country, with a history of having swallowed a marble ten days previous. X-Ray showed the marble lodged in the right bronchus. The Jackson tube was passed and the usual grasping forceps employed, but the marble was about a centimeter in diameter and it was impossible to get hold of this object with any of the usual instruments. I then resorted to low tracheotomy. The trachea was partially dilated, and the thorax compressed, but the object failed to budge. I then passed the bronchoscope into the right bronchus, and had the patient put in the Trendelenburg position, and with good illumination I was able to see the foreign body, in fact to touch it with the probe, and opening the probe at almost the right angle I was able to get beyond the marble. With the aid of the Trendelenberg position, I was able to tease the marble down into the bronchus, and it was expelled with quite a quantity of fluid. Uneventful recovery took place. Trachea immediately closed.

Dr. Stucky: I am rather surprised at the amount of discussion.

When is the recessional stage in these cases mentioned by Dr. Ballenger? I don't know. This child was fourteen years of age and from what the pathologist said I did not feel that I was justified in waiting, and after opening the larynx and looking into it, it seemed to me that the whole thing was packed. I don't see how a growth that size could ever be absorbed. It certainly could not be curetted out. Now, if the papillomata which appeared within six or seven weeks on the opposite side were the result of traumatism, it was not the result of traumatism caused by the thyrotomy, but the result of traumatism from introducing tube before I did the thyrotomy.

I think the point brought out regarding the distinction to be made between hard and soft foreign bodies is one well taken. I am sure that I lost a little child who had a pea-nut in its trachea a few months ago, because I attempted to take it out by the direct method and resorted to the tracheotomy too late.

Regarding what Dr. Loeb said just now. I did not introduce these forceps for the purpose, or with the expectation of grasping a grain of corn or a bean. I had never seen either. I introduced the forceps because the trachea in one instance was full of pus and the child was dead; in the other instance, it was full of mucous and serum and the child was dead; and the forceps were used to dilate the lower trachea, and when the trachea was dilated, the assistant forcibly pressed upon the lower ribs, the lower part of the thorax, and artificial respiration was resorted to. Now, the grain of corn coming out with the pus was probably a coincidence. The dilatation simply relieved the pressure or the constriction which held it when I dilated it and the chest was pressed upon the grain of corn was dislodged and came out. I accidentally got hold of the bean in the second case. If I had known it was a bean, I might have felt around and got hold of it, but I didn't know it.

There is much to be learned about these papillomatous growths. I think in children under twelve years of age, I should wait; but from twelve or fourteen I think it is risky.

Refering to the point made about that stitching of the trachea to the skin: I leave them stitched together for twenty-four hours, the long threads hanging, just to hold it apart a little. In both cases we had an acute edematous laryngitis as well as bronchitis, and in the first case the edema was so great that I had to use the very smallest tube that is made.

MEETING OF THE SOUTHERN SECTION, HELD IN GREENVILLE, SOUTH CAROLINA, MARCH 8, 1913, UNDER THE CHAIRMANSHIP OF DR. J. W. JERVEY, OF GREENVILLE.

REPORT OF A CASE OF GENERAL SEPSIS FOLLOWING PERITONSILLAR ABSCESS.

By H. H. MARTIN, M. D., Savannah, Ga.

The case which I have to report, that of a young, healthy, married woman with negative history, presenting first, a peritonsillar infection without apparent preexistent or coexistent tonsillitis which required six days for its development and did not really break down until the eighth day, and which was followed about one week later by a simultaneous infection of the right lung and of the endocardium, and at intervals of from six to eight days by two metastatic infections, both exhibiting the characteristics of the first one, namely; a very indolent course with little disposition toward breaking down: is certainly unique in my experience, and I've been unable to find anything like it in any of the literature at my disposal.

The question uppermost in my mind and the one which I want you to help me answer is: was the peritonsillar abscess the first cause in this case or was it simply the first local manifestation of a preexistent general infection?

I saw this case first in the early morning of Tuesday, December 3rd, 1912. At that time there was no evidence of pus formation in or around the tonsils. The left tonsil was rather prominent but pale, there was no evidence of follicular infection nor redness anywhere in the throat, but some pain on swallowing. She had been feeling badly for three days but had not consulted her family physician until the preceding day. Her temperature had been taken, up to this time only when her physician called, 99 at his first visit and 100.4 at the second visit.

A hot gargle of sodi bicarb. was ordered alternating with a spray of 2% solution of phenol, although there was no evidence of follicular infection. I saw her again at mid-day, December

3rd, with her physician and thought her much better, and she expressed herself as feeling much better. Temperature at that time was 100.5.

I saw her late that night and still there was no evidence of pus formation and very little redness. No evidence of follicular infection. Temperature was still the same. She passed a fairly good night and I did not see her until noon, December 4th; at that time she expressed herself as feeling better but complained of difficulty in swallowing. The first evidence of pus formation was present at this time, consisting of a slight edema of the velum and uvula. The tonsil was quite prominent, appearing pushed out and on palpation a rather large firm swelling was made out behind and external to the tonsil, she could talk without difficulty, open the mouth wide and had little pain; this condition grew worse, however, and late that night, December 4th, she had ¼ gr. morphine. Slept all night and late the next morning. Temperature still practically the same, 99 to 100.5.

I saw her at noon, December 5th, and all of the symptoms of the preceding day had become worse, but still no softening could be demonstrated either by palpation or by inspection. The edema had increased and the tonsil was more prominent, but still did not approach the median line; no rise in temperature above 100.5. At this time I made two deep incisions with the Graefe knife getting nothing but venous blood; this giving no relief, ¼ gr. morphine was administered and she was quite comfortable for about six hours.

At 8.30 that night I again attempted to evacuate the abscess, making three separate punctures; with the last one I rotated the knife in every direction, using the point of puncture as the fulcrum and the knife as a lever, about one-half to three-quarters of an hour thereafter she continued to expectorate blood with some granular pus. She was given ½ gr. morphine at nine o'clock and slept until one. At 1.30 I was called to see her and found her very restless and suffering considerable pain, still spitting small quantities of blood and pus. She also stated that she had awakened in a profuse perspiration and had had to change her gown, said she had had to change her gown once during the previous night also. At two o'clock I gave her ½ gr. morphine with 1-60 of atropia. Temperature not taken. She slept heavily until late the next morning and was only awakened by the visit of her physician who had given me his council and advice all through these three days. I saw her at noon that day and found

her fairly comfortable with a slight flow of thin, white, offensive pus from each and every one of my incisions. She seemed greatly prostrated but was suffering no pain. Her physician thought her prostration due to her long heavy sleep following the last dose of morphine. A trained nurse was secured at once and a regular chart kept from that time on (December 6th at 12 noon).

From noon December 6th, to noon December 7th, her temperature ranged from 98.2 to 99.6. Pulse from 92 to 104. Respiration from 14 to 20. The discharge of pus remaining rather scanty and foul smelling, but slowly increasing until by 6 o'clock p. m., December 6th, the discharge was quite free and continued so all that night and during the day following, December 7th.

By midnight December 7th, the tonsil abscess seemed to have emptied itself entirely. From 6 p. m. December 7th, to 6 p. m. December 8th, temperature ranged from 99.4 to 102, pulse from 100 to 110, respiration from 20 to 22. About 10 o'clock in the morning of December 8th, she began to show evidence of bronchitis, coughing and expectorating a thick yellow muco-pus with a very pronounced odor. This continued, growing more and more troublesome, the cough assuming the short, sharp, half-suppressed character of pulmonitis, and while the quantity of expectoration did not immediately increase it did not diminish, and was very offensive. During the morning of December 9th, she began to complain of pain in her right side; this was the beginning of what afterward proved to be a septic broncho-pulmonitis in the upper lobe of the right lung. The cough had by this time become almost continuous, but repeated examination of the larynx showed no laryngitis, but some muco-pus adhering to the tracheal mucous membrane.

On Thursday, December 12th, the trachea and larynx were both smeared over with muco-pus which apparently came from below as there was no laryngitis.

From December 9th to December 15th, temperature ranged from 98.4 to 101.6, there being no sharp rise and fall until the afternoon of December 15th, when there was a sharp rise to 103.6 without chill and a gradual rise to 105.6 at 8 p. m.

The first blood count was made on December 15th, and indicated a very grave septic condition. At midnight she had her first chilly sensation but the chart does not show any unusual amount of perspiration, and I do not think that any of us suspected general sepsis up to this time. At 6 o'clock on the morn-

ing of the 16th, she was perspiring profusely and at 8.30 had her first hard chill. Two hours later blood count showed 18,000 W. C. with 90% polynuclear. From this time on to her convalescence the history is one of general sepsis, with first, a septic bronchopulmonitis, next a septic endocarditis apparently coincident with the condition in the lung, next a metastatic focus over the coccyx, followed by a very deep metastatic infection in the neighborhood of the right hip joint. These occurred at intervals of six to eight days.

The condition in the right lung terminated by resolution beginning about December 19th, and ending about December 26th, although the cough and expectoration continued to be troublesome for a week longer, the endocarditis seeming to terminate about the same time. The first chill indicating a new focus of infection occurred on December 23rd, at 2 a. m.; this proved to be a metastatis in the region of coccyx. This abscess presented the same clinical phenomena as were observed in the peritonsillar abscess; namely, a very indolent formation with little disposition toward breaking down; the first incision being made at 8 o'clock a. m., December 30th.

It is impossible to say just when the abscess in the region of the right hip began, but probably six or eight days after the previous one as the first incision was made in this abscess on the afternoon of January 6th, and she was undergoing very sharp rise and fall of temperature with frequent chills during this period. Each of these abscesses were incised again and again before a free evacuation was obtained. About this time there appeared a recrudescence of the infection in the right lung which slowly subsided along with the other two infections.

I am indebted to Dr. C. H. Lavender of the Public Health Service for the following bacteriological report on the case:

"December 16. Drew from a vein in the arm approximately 8 cc. of blood, and distributed it in varying dilutions in three flasks of gluscose and ascetic glucose boullion. Result negative.

"December 23. Drew from a vein in the arm approximately 10 cc. of blood and distributed it in flasks as above. This blood was drawn immediately after a chill. Result negative.

"December 16-18. Sputum. Two specimens examined. Several smears stained and examined, also plates made on agar and serum agar and smears on Loeffler's blood serum slants. The stained smears showed a variety of organisms, chiefly staphylococcus and a rather slender, short bacillus which did not appear

in any of the cultures. The plates and blood serum all showed a great predominance of staphylococcus albus, the colonies of which were very numerous. A vaccine was prepared from this organism and put up 500,000,000 to each cc.

"January 2. Pus from abscess. Smears stained showed staphylococcus and a short bacillus. On plating out, staphylococcus albus and colon bacillus were recovered. Both abscesses gave the same result. The colon bacillus was regarded as a contamination for the reason that in both cases the abscess was only partially opened and pus did not appear for a day or so. They were located over the buttocks.

"A small quantity of pus, mixed with the salt solution, from the first abscess was injected into the peritoneum of a rabbit. This animal died several days later of a purulent peritonitis, and colon bacillus was recovered from the peritoneum."

The vaccine prepared by Dr. Lavender was administered as follows: December 19, at mid-day, 58 millions; December 21st, at mid-day, 116 millions; December 25th, at mid-day, 232 millions; December 31st, at mid-day, 464 millions, and January 7th, at 10 a. m., 785 millions.

There can be no question that the administration of the vaccine exerted a very favorable influence on the course and clinical symptoms of the disease, how much it contributed to recovery can be conjectured only. When the first injection was given December 19th, she had a well defined septic endocarditis and broncho-pulmonitis. She had had during the four preceding days a chill every twelve hours with very sharp rise and fall of temperature ranging from 96 to 105.6. The highest temperature recorded for four days after the administration of the vaccine was nine hours afterward, and then it only reached 101.8. The chills ceased abruptly and the temperature did not again rise above 101 until the morning of the 23rd, four days later; in the meantime a second injection had been given forty-eight hours after the first one. She did not get her third injection until noon of the 25th, temperature in the meantime fluctuating between 100 and 104, without abrupt rise or fall and without chill until the morning of the 26th, when she had a chill and sharp rise of temperature to 104 with sharp fall to 96; this continued for four days with a chill every day but one. During the next three days the temperature did not go below 101, but kept up between 101 and 105, until the 31st, when the fourth injection of vaccine was given; nine hours afterward the temperature had dropped to 100,

followed by a sharp rise to 104.5 the same night. Next day temperature dropped sharply to 98, and remained at that point for six hours, then rose sharply to 105 after a very hard chill, then fell abruptly to 96 and remained at that point for six hours. This was followed by one chill with moderate rise of temperature and gradual fall without chill, no abrupt rise or fall of temperature following. She then had a chill on January 8th, with abrupt rise of temperature followed by slow decline, the last injection of vaccine was given the next day at ten a. m., and was followed eleven hours later by a chill and abrupt rise of temperature to 105, followed by a slow decline to 98, where it remained seven hours. On the second day following, she had a hard chill but only a moderate rise of temperature on the following day. The abscess in the region of the right hip was freely opened under ether, convalescence being practically uninterrupted from that time on.

Blood counts were made as follows: December 16th, before vaccine was given when there were 18,000 leucocytes with 90% polynuclear. At 6 p. m. on the 19th, six hours after her first injection leucocytes had dropped to 11,500 and the percentage of polynuclear to 85, and at six p. m. the next day, a differential count showed but 7,000 leucocytes with 80.7% polynuclear and 1.1 eosinophiles. The next count was also differential, made two days after second injection of vaccine, showing 15,000 leucocytes with 89.9% polynuclear and .6% eosinophiles. On the 24th polynuclear percentage was 87 and eosinophiles had disappeared.

The next count was five days later and three days after third injection of vaccine, leucocytes had fallen to 10,000 and polynuclear percentage to 78.67, no eosinophiles.

The next day, December 28th, was probably the worst day of her illness. She having at that time two metastatic abscesses and apparently a recrudescence of the lung infection all at one time. Leucocytes had fallen to 9,500, while the polynuclear percentage had increased to 87.2 with entire absence of eosinophiles. No differential counts were made after this date, but on the 31st, the leucocytes had risen to 10,000 and the percentage of polynuclear had increased to 92. It would be interesting to know just when the eosinophiles reappeared.

She then had her fourth injection of vaccine and two days later the leucocytes had risen to 20,000 while the percentage of polynuclear had fallen to 90. This is the last blood count shown on the chart.

Summary.

Peritonsillar abscess can occur without preexistent or coexistent tonsillitis and may be a local manifestation of a very serious general infection.

A very serious general infection may follow a peritonsillar abscess either by direct infection of the bronchial mucous membrane through the larynx and trachea or indirectly by metastatis.

The fact that a pathogenic organism cannot be demonstrated in the blood current is of negative value in the diagnosis of general sepsis.

An autogenous vaccine is of unquestionable value in the treatment of a case such as the one described in this paper, but generally speaking should be administered in larger doses than were used in this case.

In closing I wish to acknowledge my indebtedness to Dr. Craig Barrow for the privilege of reporting this very interesting case, and also to "Take off my hat to him" for his masterly conduct of the case. It is to his intelligent interpretation of her many complex symptoms and to his skill and courage in meeting every emergency that this patient owes her remarkable recovery.

DISCUSSION.

Dr. Whaley, of Columbia, S. C., said: After hearing Dr. Martin's paper I find that I had a case that was very similar to his, except that I don't think the general sepsis could have been present before the peritonsillar abscess. I believe the general sepsis was the outcome of this, although I did not see the case until it was well advanced and I had to open the abscess on my first visit. There was a quantity of pus in this abscess. So much so, that I was afraid of strangling the patient if I had opened it thoroughly at first; so I made a small puncture and let the pus run out for fifteen minutes. That abscess drained off. Of course I opened it wider in a few minutes and it drained perfectly. It was twenty miles away from where I lived. I made a night visit to see the patient and two days after that his attending physician called me up again and said his man had a chill and complained a great deal of the pain in his abdomen. He asked me if I would not come out and see if his throat was all right. I found the abscess cavity clean, without any drainage at all. The swelling had gone down. The third day after that he developed an infarct in one lung. His mental condition and his muscles became agitated and at that time it was possible to hear a heart murmur, but up to that time the diagnosis of endocarditis was not made. He recovered, to our surprise. We left him with instructions to the nurse to give him 50 M. Streptococci every six hours until he died. Of course, we did not say this to the family, but I took that man's tonsils out under cocaine in my office six months afterwards and he recovered entirely, but I am satisfied his peritonsillar abscess was the focus of infection. As to whether he had a follicular tonsillitis previous to that, I do not know. I was called in at the time to simply relieve his embarrassment in breathing. He was about to strangle, as the doctor said.

Dr. Stucky, of Lexington, Ky., believes there is another cause of a peritonsillar abscess, besides a diseased tonsil. In the past three years I recall three cases of peritonsillar abscess, the worst that I have ever seen in my life. The most surprising thing about them was that there was no abnormal tonsillar tissue. Indeed, there was an absence of tonsillar tissue in all three of the cases. I was at a loss to account for the infection unless it was due to a toxemia, of course, without the tonsils. One of these cases was complicated with Ludwig's angina and if you have never had a case of that you have something waiting for you that is the most alarming and horrible thing that I know of. The only thing that we can do for these cases is simply to make a free incision and drain them locally, and support the vitality with heroic measures.

I am sorry that results with the vaccines with me have not proved satisfactory. I have used the staphylococci and the streptococci solution, and I don't know that I have gotten any results whatever. But I arise to speak on this topic, simply because of the fact that many of us are under the impression that a peritonsillar abscess must result from an infection of the supratonsillar fossa as a result of a diseased tonsil. I have seen three cases in which there was no abnormal tonsillar tissue. Where did the infection come from? I am inclined to believe it was an auto-toxemia. One of these cases had metastasis with the heart lesion. All three of them, fortunately, got well, but there are infections in the tonsillar region that are outside of the tonsil itself.

Dr. Jervey, of Greenville, S. C., asked Dr. Stucky if he understood correctly when he said there was no tonsillar tissue present, or no abnormal tonsillar tissue present?

Dr. Stucky: None that I could find. I could not find any tonsillar tissue at all. They were all adults. I will emphasize this point: I could find no glandular tissue.

Dr. Whaley: I would like to correct the impression that Dr. Stucky has got from my remarks. I do not attribute the cure of this patient to the vaccines, because I have had no results from them at all, and I have used a great many. I made a mistake once: A patient had a tonsillitis, temperature 104, I gave this patient 50 M. Streptococci and the temperature dropped immediately and never went up, and I found afterwards that she had gotten 50 M. Gonococci; so I would not like to say that any vaccine that had ever been given, would control the temperature. But any patient who has the power of reacting will necessarily be stimulated by the action of any bacteria introduced into the system.

Dr. White: What I am going to say has no relevancy to the Doctor's paper, except as to the use of serum in infection. It is my personal experience. I got an infection in my finger, in a mastoid operation. The glands swelled in the arm and an abscess developed in the auxillary gland. I had seventy-five operations done on me in eighteen months,—in cutting open the boils, abscesses and carbuncles, and no treatment that I was subjected to (and I consulted the best men I could find in and around Richmond)—nothing I could find did me any good. Dr. Hopkins, the bacteriologist at the U. Coll. of Medicine, suggested trying injections of Staphylococcic serum (Mulford's staphylo-bacterin). At that time I had a carbuncle, two or three boils, and an abscess. He gave me one injection of Mulford's serum, followed by a second ten days afterwards: in thirty days I was perfectly well, after trying every treatment. As this was my own personal experience, I am naturally disposed to think it has some merit.

Now a year later (I don't know how I got it,) but I began to have what we used to call a "bone felon" on my forefinger. As soon as the symptoms began, I took one injection of the same serum. The

inflammation subsided in twenty-four hours and gave me no further trouble. Hence I think the treatment certainly beneficial in a great many cases, although it may not be so in others. It may depend upon the condition of the patient.

Question: Dr. White, did you use the bacterin or the serum on yourself?

Dr. White: Staphylo-bacterin (stock vaccine).

Dr. Martin, in closing the discussion, said: The points I particularly wished to bring out in this paper were the fact that this girl had a peritonsillar abscess without tonsillitis. Her family doctor had seen her a couple of days before I did, and during all the time that he and I treated her. There was no tonsillitis of any description. Another point: the question of vaccines. I have never had any experience with stock vaccines, but this is the second case in which I have used autogenous vaccines for septic infections, and I don't think that there is any question that the vaccine saved this girl's life. In writing this report, I did not go into all the details as a surgeon would, but simply reported the essential features in a general way. The patient's condition was growing steadily worse when the vaccine was used. There can be no question that the autogenous vaccines stopped the progress of the case and gave her an opportunity to get well.

Another thing,—the question I asked you first: Did this girl have a general sepsis which manifested itself first as a peritonsillar abscess or did the abscess cause the general infection? I think that a hard question to answer, and it is one that has puzzled me no little.

THE AFTER TREATMENT OF CASES OF RADICAL OPERATIONS IN OTO-RHINOLOGY.

By J. A. STUCKY, M. D., Lexington, Ky.

The suggestions which I am about to make are the result of lessons learned in an active practice in oto-rhinology for more than a quarter of a century. These lessons in major surgery are learned from more than 500 mastoid operations, 59 frontal sinus operations of the Killian or modified Killian type, 31 extra-dural and 19 intra-dural abscesses, 160 Caldwell-Luk operations upon the maxillary antrum and probably more than 1,000 middle turbinectomies, in which perhaps fifty per cent of the ethmoid cells were removed.

I make no apology for reading a paper upon this topic. It is not intended so much for publication as for discussion. It is for those of us in the South, living in the smaller towns and cities far from the large clinics in metropolitan cities which are conducted by a number of our ablest men of large experience and great ability, who come in daily contact and consultation with each other, who are protected and assisted in their work by city, state and the hospital clinical laws. Their indigent clientele are fed and clothed and the clinicians furnished without financial cost every facility and aid for their work. Not only are the hospitals the best equipped, but the nurses are the best trained and in the largest number. The clinical and laboratory reports and after treatments of each case are carefully kept by well trained internes and house surgeons.

Those of the Southland do not have these facilities, protection and opportunities. On the contrary many of us have meagre facilities, few opportunities for consultation and observation of other men's work, and our indigent clinical cases frequently cost us money, time and opportunity. In all my experience in oto-rhinology I have never had but three cases of thrombosis of the lateral sinus and have never ligated or removed the jugular vein. My scientific curiosity on more than one occasion has gotten me into trouble, not serious, but annoying. My over-anxiety in certain cases on more than one occasion has overbalanced my judgment and I have

trusted too much to science and self and not enough to nature, and this experience has taught me as many things to avoid as it has taught me things to do.

All of us acknowledge a great debt of gratitude to our brother practitioners of the large medical centers whom many of us regard as Gamaliels in oto-rhinology and it is because of the presence of some of them with us today that we want to discuss this topic and have them tell us wherein we have fallen short. The things that militate against satisfactory results in all surgery are:

1. The incomplete operations.
2. The lowered power of resistance of the patient as the result either of delay in having the foci of infection removed or else whose recuperation has been retarded by a lowered body resistance as the result of auto-toxemia, or shock from too profound and long continued anesthesia.
3. The too long continued dressing of heavy, uncomfortable material which by the heat and moisture favor formation of exuberant granulations and lower the vitality of the external parts.
4. Imprudence in diet immediately following the operation and insufficient rest of mind and body.

By the incomplete operation I mean we fail to thoroughly remove the foci of infection, and establish unobstructed drainage and ventilation. In oto-rhinology ventilation is as necessary as drainage, and herein lies the difference between this and surgery of any other part of the body. There is a tendency to do an over-complete operation, by removing tissue not involved beyond restoration by the pathological process. A complete operation does not require that we chisel, curette, drill and polish the operated area till it shines like a china teacup. Such a procedure is detrimental in that it prolongs the operation unnecessarily and greatly retards the process of healing by granulation and dermitization.

Years ago I was taught this lesson by Gustav Killian, who at my request criticised my method of doing both the radical and classical mastoid operation. He said, "You vas vell finished with the operations before you quit. Such a fine polish of the bone is not necessary." The honest, candid criticism was a valuable lesson to me. Do a complete operation, but do not over-do it.

Where the body resistance is lowered by sepsis, and auto-toxemia as revealed by careful differential blood count and urinalysis, the anesthetic is given most cautiously, maintaining only the minimum stage of anesthesia during the entire operation; the amount of ether necessary for this being greatly lessened by the admin-

istering hypodermically from 1/8 to 1/4 grain morphia one half hour before beginning administration of anesthetic. Too much of the anesthetic has been given and more or less harm done if the patient is not sufficiently from under its influence to open the eyes and respond to slapping or pinching of face by the time the final dressing and bandage is applied before leaving the operating table.

Unless the patient is in the hospital from twelve to eighteen hours before the time of operation, no purgative is given until after the operation but the bowel emptied by copious enema of soap-suds, no other preparation is made except a tub bath followed by alcohol rub of entire body, the scalp is shampooed with mercurial soap (1% mercurial iodide P. & D.), the necessary preparation made of area to be operated and dry sterile dressing applied.

After a simple mastoid operation, the outer dressing is removed in 24 hours. I do not pack tightly the mastoid wound. Pack it very loosely. Cut the stitches at the end of the third or fourth day and remove the first packing at that time, and if the bone is covered all over with healthy granulation allow the wound to fall together. Do not continue the packing process, either with sterile gauze or with iodoform gauze or anything else, after the bony cavity is well covered with healthy granulations. Granulations want nothing better than moisture and gauze to stimulate growth. I do not irrigate the wound but wipe it out with sterile gauze or cotton, or, if a stimulant is indicated, use iodoform gauze, instead.

If I use a modified blood-clot dressing in the classical operation, (and this I am very fond of doing) a very small cigarette drain, made of two or three strands of silk-worm gut is left in the lower angle of the wound, and the rest of the wound sutured tightly. When the first dressing is removed twenty-four hours later the little drain is pulled out and the wound is left alone. I expect the patient then to be out of the hospital in from three to six days. I think we make a great mistake in keeping our patients in bed so long, and my rule now is to get them in the wheel chair and out on the roof garden or in the sun parlor by the second or third day, at any rate up and out by the fifth or sixth.

In the radical mastoid operation the outer dressing is removed in twenty-four hours, and then a very light gauze dressing applied. The inner dressing is not removed. If I use the large

rubber tube in the auditory canal instead of the gauze packing (which is another modified blood-clot dressing) this is allowed to remain for forty-eight hours. If I pack the mastoid wound after the radical operation, this is not removed until the third or fourth day, when it is removed easily. After the first packing is removed, I use no more gauze, except a small wick along the floor of the canal, going well back to the middle ear, for drainage. I use no irrigation of any kind, and until the whole area of the bony cavity is covered with firm granulations I cover the entire operated area with a uniform coating of equal parts of iodoform and boric acid or aristol. I believe iodoform, notwithstanding its disagreeable odor, is more effective in bone cases than the aristol; uniformly cover the bony cavity with this twice a day. That means a little more work for the assistant or the well-trained nurse, but healing is greatly hastened by this frequent attention. As soon as the cavity is covered with granulations I leave off the stimulating aristol or iodoform and use the pure boracic acid powder twice in twenty-four hours. If I have done a clean operation I shall expect complete dermitization in three to six weeks after the complete radical mastoid operation. I think a great deal of the long-continued after treatment heretofore so necessary has been due to the fact that we have used too much irrigation and done too much packing. I get the bandages and the heavy dressings off of my radical cases by the 5th day, then put on a very light dressing kept in place with a light mask to cover the external ear and wipe out the canal with a sterile cotton swab and repowder it with boracic acid at least every 8 or 12 hours.

If the patient, for instance, is very septic, the leucocyte count is low and the polynuclear percentage high, I begin large doses of urotropin, before the patient has recovered from the anesthesia, given by the bowel, 30 to 60 grains in three or four-ounce salt solution, used as we do protoclysis, usually this is accomplished without trouble. Four hours thereafter, if the stomach is quiet and no nausea, 10 grains of urotropin is given every four hours, in four or more ounces of water, until two or more drachms are given.

As soon as the patient recovers from the anesthetic, I give one large dose of calomel, never less than 5 or 10 grains at the first dose, and rarely ever more than 15 or 20 grains. If the patient is very septic, the urine full of indican, I give a dose of 15 or 20 grains calomel, followed by magnesia sulphate in six to eight

hours. Whether it be a radical mastoid, frontal sinus or what not, the patient is on a restricted diet for at least three days. I want all of the resistive forces to go to the repair of the wound, the recovery from the shock, and not to be utilized in faulty digestion assimilation and elimination. The patient is not going to starve in a few days. Give fruits, buttermilk, broths, etc., and rest—mental, as well as physical rest. I think, as practitioners of medicine, we do not fully appreciate the great advantage of the psychology of the after-treatment of these cases. I do not like to have relatives and sympathetic friends around the patient for at least two or three days after the operation. Let them see nobody but the nurse and the doctor. We all know something of the effect of mind over matter and the mental attitude of the anxious and sympathetic parent or relative is frequently injurious. Especially is this true with children.

In the modified Killian frontal sinus operation I use no packing. I put a large rubber tube down through the floor of the frontal sinus and bring it out of the nose. Of course if the turbinates are removed the anterior ethmoid cells are removed also and there is no packing used. This external wound is closed tightly at the time of the operation, the tube is removed in from 24 to 36 hours, or as soon as it will come out without use of force; when you desire to remove the tube take hold of it at the lower end with a hemostat and make slight tension on it and it comes away without trouble or bleeding. I am sure, in my first cases, I did a great deal of harm by irrigations and mopping causing irritation, and often a mixed infection retarded the healing process. What the wound needs is drainage and ventilation, and if I have drained and ventilated it well, this is going to do it more good than anything else. If the nose is obstructed on the floor you can clean it out by aspirating with a medicine dropper and sterile saline solution or use forceps and cotton mop. In the Caldwell-Luk operation through the canine fossa, a thorough opening is made into the nose. I usually pack the cavity once only. At the time of the operation I pack it lightly with gauze soaked in 25 per cent solution argyrol, left in for 24 hours to 36 hours, then remove it, and use a small wick to keep the wound open for a day or two. In cases of this kind I would irrigate once or twice, perhaps, the third and the fourth day; after that there is no irrigation, the wound is allowed to close in the mouth and the drainage and ventilation take place through the nose. After removing the middle turbinate and curetting the ethmoid cells, I never use any packing, and

I am not troubled with hemorrhage and obstructed breathing as formerly, since I have been using the flexible perforated nasal tube splint. This prevents the patient from snuffing and snorting and getting a loose clot, and respiration and drainage is not interfered with. I keep these cases in the hospital for 24 to 48 hours.

This is, briefly, the method that I use in my major cases. I have nothing new to add about the brain cases. I still adhere to the teaching of Ballance when I open a brain abscess: As soon as I find pus, I leave my perforator or probe in situ and insert several small rubber tubes alongside of the same, until sufficient number are placed for drainage of the abscess cavity and never use gauze. If I withdraw my knife or perforator with which I have found the brain abscess and re-insert it, or forceps to insert the drainage tube, I am going to open up new avenues of infection; I remove one tube at a time, beginning, perhaps, on the third, fourth or fifth day, until finally we get down to the one tube and that is practically pushed out in the process of healing. The same treatment that I have suggested holds good with the extra-dural abscesses. We usually find these as the result of infection through the tegmen tympani or antri, and in these I use no firm packing.

In conclusion I need not emphasize that all after treatment should be given in a strict aseptic or antiseptic manner, in order to avoid localized secondary infection. Do a clean complete operation, but do not "over-do it." Especial care should be given toward restoring to normal the lowered resistance caused by the condition which rendered the operation necessary—to this end attention is given to the internal secretions and excretions—slow and unfavorable progress after many complete operations done with faultless technique, is often due to injudicious food and insufficient rest. After major rhinological operations I give small doses of iodine three times daily until its effect is indicated by increased discharge of mucous from the nose.

DISCUSSION.

Dr. H. Holbrook Curtis, New York, said: This paper is on the after treatment, as I understand, but may I be permitted to speak of some features which may be of interest which may modify after treatment?

In every case of mastoid operation in which I ever asked anybody in consultation in New York, I have been advised to clean out every possible cell of the mastoid, and remove the tip. I am reminded of a remark by Dr. D. B. St. John Roosa within a year or two of his death; he said: "I am confused with all this modern mastoid surgery. For twenty years in the New York Eye and Ear Infirmary, we used to make

a little gimlet hole and keep it open, and they all seemed to get well." It is a great bugbear to the man who is not an expert otologist to be obliged on occasions to do a mastoid operation. It is well to remember that it is better to penetrate the cortex and establish drainage, if you don't do anything else, rather than through timidity, risk a brain abscess. The wound may discharge for a very long time, but I think the up-to-date literature frightens many men from attempting the simple mastoid operation. I am not belittling the importance of the complete mastoid operation as discussed in the classical work of Whiting, and I always try to do it myself, but it is also well to remember that the cell walls become the points of weakest resistance in a half-done operation, and the wonderful processes of nature will, in a majority of cases, complete the work of the bungling surgeon by a suppurative process, provided the mastoid wound is kept open and aseptic.

Speaking of sutures, in the after treatment, I think nearly every one in New York is using the Michéls Suture. The clamp goes on so easily. I did a radical mastoid operation a few days ago and removed the clamps in two days. You usually get no suppuration whatsoever, and as the danger to the wound is not from the wound itself, but from your suture, I think the metal suture should be employed. I think we have all stopped tight packing in mastoid work. After the Killian operation, today nothing is put in, not even a tube. I very seldom do the Killian. I read the first paper on the frontal sinus operation in this Society in 1902, presenting three cases. The method of operation I had devised myself; treating the frontal sinus as you do a mastoid and letting the granulations fill up the wound before closing it. I reported 150 cases of the intra-nasal operation in 1906, and I have been doing the internal operation ever since. I clip off the front of the middle turbinate with forceps, open the ethmoid cells, employ the curette, and then use the little Ballance electric drill, with a button on the end, and get a large enough opening into my frontal sinus. In those cases I find douching is absolutely necessary for a little while, because the drainage is not perfect. You all speak of the operation on the antrum, but it has not been emphasized that you should take off all you can of the inner wall of your antrum that lies beneath the inferior turbinate. With my gouges and sickle knives, it is possible to make an opening into the antrum, without loss of much blood, under no general anesthetic and practically with no pain to the patient. I simply fill the antrum through the natural orifice with a solution of cocaine and adrenalin, put the same solution above and below the inferior turbinate on cotton, and in three or four minutes I am ready to do the operation. After curetting, the antrum is packed with iodoform wool. This is simply the worsted they use in crocheting baby carriage blankets treated with 5% iodoform, and by its expansion it covers every possible portion of the wound, and, unlike gauze, it is very easily taken out on the second day. I do no more irrigating except for a few days. If you don't make the orifice large enough you will have trouble. You can put in a little Holmes lamp into that orifice and see every portion of the antrum, and if you have any polypoid tissue you can remove it.

In the removal of the turbinate bodies; it is all very well to speak of not putting in any dressing, but sometimes, after an inferior turbinectomy, you have a tremendous hemorrhage. I think the best preventive is the Bernay Sponge. I get the sheets, and cut them to fit the condition and apply enough thicknesses to make gentle pressure, leaving in for twenty-four hours. In severe hemorrhage both sides may be packed. As regards synechiae, I do away entirely with recurrent nasal adhesions by having flat probes of copper, and I teach my patients to wind them with a couple of twists of absorbent cotton, dipped in vaseline and to use them two or three times a day, increasing the bulk of the cotton. I never let them go home if they are out of town patients without teaching them to separate the cut synechia daily. It must be continued for a long time in some cases.

Dr. Ballenger, of Chicago, Ill.: Dr. Stucky has opened up such a wide field we could discuss it for an hour. There are a few points that I want to discuss—not that I want to disagree with anything the Doctor has said, as he has a good paper.

As to making the mastoid wound smooth, he is quite right that it should not be made smooth, but that does not mean that you should not open all the cells, but that after opening all the cells it is not necessary to go on and break down the last vestage of the partitions. Leave some mucous membrane and periosteal membrane in the wound, from which granulations will later spring up and result in rapid healing. If you remove all this, you will have dense, bony tissue left, and very slow healing. Then, too, the speed of healing is in proportion, somewhat, to the character of bone change that has taken place. If the bone is in normal condition, the healing is rapid, but if it has undergone change, the healing will be slow.

The dressing of the mastoid wound is a subject of interest. There are still some prominent otologists who firmly pack the mastoid wound.

Dr. Stucky uses the word "packing" when he does not actually mean packing at all. We formerly packed the wound with gauze. Why? To prevent exuberant granulation so that the granulations had something to butt against, and finding they could not get through the gauze, the granulations were suppressed to growing. I have heard that argument presented by many eminent men. I replied I used to have granulations myself, when I packed, but now I rarely have exuberant granulations, and I do not pack. I introduce a little strip of gauze and put it in the bottom of the wound, as a wick to a lamp. I anchor the flap. I said, "I do not have granulations, and I do not pack; how do you explain that? The reason that you have granulations is because you pack." So there we stand today, with a difference of opinion. You are apt to have granulations with poor drainage, and you cannot have good drainage with packing. The gauze becomes saturated with the secretion, which keeps the wound constantly bathed in it until decomposition takes place, whereas if you place a wick into the wound and allow the secretion to be absorbed by capillary traction and carried out of the wound, you would not have decomposition or granulations. Hence in my mastoid operations I drop a wick into the wound and connect it with a little pad of gauze in the auricle. These are removed from the third to the fifth day following the operation.

As to the hospitalization of patients, one effect is psychological and the other is the depression of vitality which comes from a certain type of hospitalization itself. There are men who are proud of the fact that they never operate except in the hospital. You ought not to be proud that you never operate except in the hospital, because some patients are better operated outside of the hospital. I remember hearing a paper by a man who reported an unusual number of complications following the tonsil operation. I said, "The reason you have so many complications following the tonsil operation is probably because your patients are kept in the hospital for a week. The vitality is lowered because they are kept in the hospital for a week. They are leading a very inactive life, and that leads to complications. Hospitalization means psychial shock, to many patients. You know what a dread people have of the hospital, to begin with, then the physical depression due to the inactive life, has to be taken into account. If you get a depressed vitality, you have slow healing and possible secondary infection. Weir Mitchell addressed us recently on hospital work in the Civil War. He was one of the surgeons, and he told us some interesting things, among others this: that they had erected large wooden buildings for hospitals, but they soon found that these buildings were not ample to take care of the wounded soldiers, and so they erected tents, and he said it was interesting to note that those people put into the tents healed much

more rapidly than those put into the new wooden hospitals. Another thing, that the patients sent home after being wounded got well earlier than either of the others.

I rarely use irrigations, as I think most of you do not. Dr. Stucky, in a previous paper, called attention to treatment of high temperature following the mastoid operation, but not in this. When he had a high temperature following a mastoid operation, I believe he has been in the habit, (when he does not know whether he is getting an intracranial complication) of giving 2 to 10 grains of calomel, followed by castor oil, then salts. I have seen a number of cases in which high temperature followed the mastoid operation in which the temperature rapidly subsided after the Stucky catharsis. I followed Dr. Stucky's suggestion by giving the three cathartics in succession and found my patients got relief in a few hours from the alarming symptoms.

As to the nasal dressings: Several years ago I began to advocate the non-use of nasal dressings, in the sense of gauze packings, and I have been practicing it in almost every case except in my submucous resection operations. Several years ago the Laryngological Association met in Chicago and Dr. Ingals was introducing his operation on the frontal sinus, and Dr. Mosher of Boston called attention to the dangers of a blind operation like that injuring the anterior ethmoidal artery It made a great impression on me, so much so that I was cautious for a while about my work in that region, but after a while I began to go farther and farther until I perfected my radical ethmoid operation. I found then that they did not bleed so badly as Dr. Mosher had indicated. They would ooze for from 12 to 24 hours, but that awful hemorrhage, which is liable to cause death, did not occur. So that I quit packing except in the presence of very profuse and persistent hemorrhage, and now I do most of my operations in the office and send them home with only a little cotton in their nose, which is taken out as soon as they get home, and not one in two hundred will bleed so as to cause any danger after the operation.

If you pack the nose with any sort of a dressing, that amounts to an obstructive packing, you have a greater danger than the hemorrhage meningitis. If you pack the nose, you obstruct drainage. I was told in one of the large cities that they had had four deaths from the removal of the anterior end of the middle turbinates. I have removed both the ethmoidal cells and middle turbinated body in several hundred cases in the last ten years, and have never had a case followed by meningitis. Now why should a few dozen operations be followed by three or four deaths by a slight removal of tissue, when I perform hundreds of operations more radically and have no deaths? In the first case, they had obstruction, caused by packing. They tried to overcome obstruction and then increased it by packing, which was followed by meningitis and death. When I remove all of the ethmoidal cells and the turbinated body, it is practically impossible for the tissues on the septum and the orbital walls of the nose to swell enough to cause complete obstruction; whereas if you remove only part of the tissues, a little bit of swollen tissue will cause complete obstruction. The complete operation on the ethmoid is the safe operation if the technique is mastered. In my operation you get a wide space which can, with the greatest difficulty, become so swollen as to cause obstruction. Now, leaving out the packing, you get good drainage following the operation, hence you have few deaths. I make a plea for little or no packing after ethmoid operations.

Dr. H. S. Hedges, Charlottesville, Va.: The after experience with the blood-clot treatment of the mastoid—we don't get the number of mastoids, of course, as in the large cities. The most ever seen, I think, were fifteen, and we have only had three this year; but we treat them altogether by the open method, and the blood-clot cases I have seen come from other men have been disastrous.

What has been the experience of the men here with regard to the blood-clot method of healing? I have seen nothing but bad results following.

Dr. White, of Richmond, Va., said: Dr. Stucky has spent more time upon the methods of operation than he did upon the after treatment, and, as I understand his paper, it was the after treatment that was to be emphasized and not oto-rhinological operations.

I agree with Dr. Stucky about what we men in the South have had to learn without the opportunity of satisfactory consultation. I know I was practically one of the pioneers of the South, and was dependent entirely upon what I could learn out of my own experience, unless I could go away to find out what other people were doing. For several years I was the only man in the State of Virginia, and, in fact, I believe there were only two of us in the Southern country for a long time;—Dr. Calhoun in Atlanta and myself in Richmond.

I have not done as many mastoid operations as Dr. Stucky. I have never reached the 500 mark, but I have done a great many more operations than the Doctor reports, on the frontal sinus, ethmoid, and so on, than he has, and my experience is not exactly the same as Dr. Stucky's.

Following mastoid operations, I simply have two methods—the result of my own experience. When I have the dura or the sinus exposed, I never close the wound. I leave the wound open, put in very light packing and let it heal by granulation. If I have no exposure of the sinus and no complications—a simple mastoid operation—I close the wound entirely, leaving a small opening at the bottom, and put in a small drain all the way from the antrum the whole length of the wound and remove it in two days, but put in no other packing and no further drain. My experience, so far has been very satisfactory, because, in something over 200 operations on the mastoid in the last twenty-five years, I have been lucky enough never to have had but two deaths.

I formerly had the idea that in operating on the frontal sinus it was almost always necessary to do an external operation. I considered that an operation through the nose was much more dangerous, was followed by a long-continued after-treatment, and that the results were never satisfactory. Now I have come to exactly the reverse opinion. I never do an external operation of a frontal sinus if it can possibly be avoided. When I do a Killian I do as Dr. Stucky: Put simply a rubber drain down into the nose and remove it in two or three days, and follow it by no further packing. But my experience with the Killian operation has never been any more satisfactory than the internal operation. In the last week a lady came to see me,—an English woman who had just come to Richmond in the last month or so, who had had a Killian operation done by one of the most expert operators in London. She had a dreadfully disfiguring scar on her forehead, the whole anterior wall having been removed three or four years ago. I found the frontal and ethmoid sinuses filled with polypi and secretion, with secondary empyemia of the antrum. This is the result I sometimes have had after my own external operations. I now do almost entirely the internal operation.

While not in line with this discussion, I would call attention to an instrument devised by Dr. John Dunn. He has modified an ordinary mastoid curette and had it made in two sizes for opening the antrum and frontal sinus. It is the simplest thing to open the antrum with the large size or get into the ethmoid with it, and with the small size you can open the frontal sinus, without practically any danger at all. You are running no danger of breaking through into the cerebral cavity. My experience with operations on the ethmoid and frontal sinus is that they require a long after treatment. In doing these operations I think it is unwise to do too much curetting. It is unwise to strip off the mucous lining, if it can be avoided, because it often

results in trouble with the bone. Recently I have had an unusual experience with this operation. About a month ago I opened the ethmoid of a young man, found it full of polyps, curetted carefully, as I thought, and he came to me afterwards and told me that since the operation he had had very little or no secretion, but that he had no feeling on that side of the nose, and I found that to be the case. In other words I, in some way, injured the nasal branch of the fifth pair in the operation, and that side has become perfectly dead. I never saw that result before, and he says it gives him a most curious sensation all the time

My after treatment in these cases that I open internally is different from Dr. Stucky's. I use irrigation all the time, make them keep the parts clean by syringing, and find, after a satisfactory opening has been made, that that method is perfectly satisfactory, as the patient can take care of himself to a great extent. Not in every case, of course, because we don't get success in every case. In antral operations I cut away the nasal wall of the antrum enough to allow the patient to wash it out himself, using a small tube which is readily passed into the antrum. I have almost given up doing a radical operation on the antrum or frontal sinus except some exceptional cases of empyemia. In doing a turbinectomy I used to pack, to stop the hemorrhage. Now, if I have to amputate the middle turbinate for any cause, (and I do all of these operations in my office), I give the patient a small basin, put him in one of the offices, and let the nose drip as long as it will. If it does not stop I give him an injection of pituitrin, and I recommend it to you all to try, if you have never used it. In my experience I have seen magical results from it. It does not work in every case, but it modifies the bleeding in nearly all cases. Even in profuse hemorrhage I have seen the dripping stop in from 30 to 60 minutes after it has been given. Of course that may be of value, as I have seen a very dangerous hemorrhage follow an amputation of the turbinate, just as very dangerous hemorrhage sometimes follows the removal of the tonsil, although in the latter operation, when I could not stop the hemorrhage by pressure I have ligated the common carotid; not the external carotid.

Like Dr. Stucky, in the number of mastoids I have had, I have never had to resect the jugular, and have never had a case of general infection but once, and that one died; (That was one of the two cases that I lost). I have had, however, to resect the external carotid on two occasions for malignant trouble in the antrum. In one of these cases it was satisfactory in deferring the end for some time, and in another it was of no value whatever. One was a case of carcinoma, in which it proved of no value; one was a sarcoma in which it proved of value.

Dr. Ballenger: I did an ethmoid operation upon a patient, and in a few hours afterwards, he was delirious and had to be held in bed. Made a spinal puncture, found his spinal fluid loaded with pus and bacteria and found from my records, that "the patient complained of very severe headache." He had meningitis when he came to my office and I did not recognize it. I operated and the circumscribed meningitis became a diffused meningitis and he died. This is the only death following my ethmoid operation. In this instance the death was not due to the operation, but rather to my failure to diagnose an existing meningitis.

Dr. White: In the days when I used to pack the nose, I reported a case to the Society, of a young man on whom I did simple turbinectomy and packed the nose. I did the operation about eleven o'clock in the day. That evening, at his hospital, he was found unconscious in his room, was carried to the hospital of the Medical College of Virginia, and he died within less than twenty-four hours after. Examination of the urine at the time, showed it to be loaded with albumen. It was

a question whether it was a meningeal complication resulting from the operation or uremic poisoning. The concensus of opinion seemed to be that it was uremia.

Question: Did he have hemorrhage?

Dr. White: Some, and I packed to stop the hemorrhage, but I do not pack any more after operations, as I find they do better without it.

Dr. C. M. Miller, Richmond, Va., I was very much interested in what Dr. Stucky said, and I think I practically agree with him in all his points. One point I agree with him in: the point of psychology, in over-running the patient with friends afterwards. I do not think that anything in my experience has given me more trouble, than a room full of friends. They disturb the patient and they constantly want to know, "Where are you suffering?" "What hurts you now?" etc. And these constant suggestions keep the patient on the edge all the time and are responsible for a great deal of trouble and certainly of lowered resistance. I find this more true after my tonsillectomies than I do in anything else. Just as soon as you get into one of these emotional families and the whole family and connections come around the patient, your patient has a sore throat and cannot swallow and they have stiff necks and all that, until you prohibit all the friends being around. I remember two cases I have had recently, one of them an only child of Jewish parents. During the last Jewish holiday, I did a tonsillectomy and carried the child home from the hospital at the end of twenty-four hours, and all the friends came around. The child had a little trouble in taking liquids, and the mother and friends began to sympathize with it, and actually called a doctor there from a distance, who was a relative, and he immediately began asking if the child's neck was stiff, and for a week the child could not move its neck, and the doctor made some explanation to the family, that in doing the operation for tonsillectomy I cut some tendon, and that the child was going to have a wry neck for the rest of its life. In all my operative work, particularly on children, I think I am troubled more with this: the upset condition by suggestion of parents and friends, than any other one thing, and I do not believe we appreciate the importance of it enough, and we allow ourselves to be persuaded by the families to let them come in, and certainly an infinite amount of trouble to the physician is caused, and I have no doubt that bad after results of this apparent physical suffering are also common.

Dr. Stucky, in closing, said: I appreciate very much the very free discussion of my paper. Like Dr. White, I do not do as many of the Killian operations as formerly. I am doing more and more of the intranasal operations and getting better satisfaction from them. The after treatment of these cases, whether it be a frontal sinus or a middle sinus treatment, the secretion must come from within. In order to get the mucous membrane to secrete quickly I give small and increasing doses of iodine three times a day until the nose begins to discharge. I am sure that I have found that a great deal of harm comes from irrigations.

I am especially glad to hear, Dr. White call attention to pituitrin. I had not thought of that and will try it.

In reply to Dr. Miller's remarks, I think that psychology demands more attention than we have given it. We Southerners are a sympathetic, anxious lot of people, and the parent frequently wants to direct the after treatment. The sympathy aroused and the anxiety on the part of the parents and friends does a great deal of harm.

The doctor asks about the blood clot. In using the blood clot, I believe we have everything to gain and nothing to lose. The external dressing is changed the same as in a classical mastoid operation, and

if there is any indication of that blood-clot breaking down, it is easy to take out stitches, open it up and convert it into a classical mastoid operation and pack, if you want to. I have never seen any harm result from the modified blood-clot dressing.

Dr. Greene asks about packing after operating upon the inferior turbinate. Some years ago, I ceased to interfere with the inferior turbinate. There is no part of the nasal cavity for which I have more respect. The inferior turbinate is a real bone and does not often need surgical interference, and disease of the middle turbinate is, nine cases out of ten, due to trouble higher up. The obstruction is high up and not low down. We need the inferior turbinate with its erectile tissue, and to give moisture as well as heat to air inhaled, and I have practically, except in rare instances, ceased to remove or to cauterize the inferior turbinate. I sometimes fracture it and reset it, when it presses against the septum, and I put it back in position, but do not remove it as formerly.

The use of hyascin advocated by Dr. Curtis,—I very frequently give it, more frequently with morphia than without, but in the last three weeks I have had quite a bit of mental disturbance in three elderly people, to whom I have given 1/100 gr. of hyascin. They were decidedly "batty."

Dr. Roy asks about the malleable metal splints. These splints were modified by Dr. Braden Kyle several years ago. They come in different sizes. You can adjust them to any desired size with your finger. I introduce a splint large enough to fill the nose, then insert the speculum with the splint and widen it until it produces gentle pressure. The patient breathes through his nose at the very start. The clot forms on the upper part of the tube, and we have no trouble, then, with a loose clot. I let the splint remain anywhere from eight to twelve hours.

I am glad Dr. Ballenger emphasized the point about polishing the bone, and also called your attention to the fact that I used the wrong word when I said "pack." I do not pack any of my wounds.

I agree with him that hospitalization is dangerous, and for that reason I get my patients up and out of bed the fifth or fourth day and then home. Get them out of the hospital as soon as possible.

The high temperature I did not speak of because I forgot it. I do not give 1/4 gr. calomel every fifteen minutes. I give calomel for its effect. A patient with a high temperature and chill, I give from 10 to 20 grains calomel. You have no griping and disagreeable after effects from the large doses of calomel as you do from the small ones, frequently repeated. In the large dose you have an antiseptic and sedative. Follow that in four to six hours by castor oil, and two hours later by your sulphate of magnesia, and the temperature usually drops, and I think, probably for this reason, I do not have these sinus thrombosis cases.

I think we ought to teach our patients if they have enough confidence in us to do the operation, they must trust us for the next four or five days to treat the patients.

SOME INDICATIONS FOR SUBMUCOUS RESECTION OF THE NASAL SEPTUM OTHER THAN APPARENT OBSTRUCTION OF NASAL RESPIRATION.

By CLIFTON M. MILLER, M. D., Richmond, Va.

The subject of submucous resection of the nasal septum has occupied such a large space in rhinological literature during the past few years that it would seem as though there were nothing left to be said, but it has appeared to the essayist that, though much time and attention has been given to the consideration of the operative technique of those cases which present angular deviations, other portions of the subject which are of importance have been somewhat neglected.

In selecting the title of this paper, the term "apparent obstruction" was used because the cases and conditions which are to be considered are cases of obstruction, but that obstruction was high up and the stoppage of either nostril for a period of five minutes would allow sufficient air to pass through the other to keep the patient comfortable.

In spite of this, there is obstruction of nasal respiration, for the air current, while it passes over the inferior turbinate, does not go into the olfactory region of the nose nor pass over the openings of the nasal accessory sinuses, hence aeration and drainage of the cavities is not accomplished, and the resultant pathological changes give many symptoms that are not always fully pointed out in standard works on rhinology.

Both Ballenger and Phillips, in their most excellent text books, say "High deviations of the nasal septum are prone to cause frontal headache, which is most severe upon waking in the morning. If this headache is of ocular origin, it subsides at night and recurs upon use of the eyes during the day." While this statement is true in the main, there are so many exceptions to it that it should not be allowed to pass unchallenged.

Packard, in his text book, in the chapter on reflex disturbances gives many valuable references. This chapter is well worth our careful perusal and here he calls attention to H. Gradle's report of cases of asthenopia which were caused by intranasal disease; these asthenopias were usually the result of trouble in the anterior ethmoid and frontal region.

A. L. Whitehead, in 1905, in British Medical Journal, says: "Nasal disease is undoubtedly the cause of headaches in a certain percentage of cases, but that it is doubtful whether it is possible for headache to be produced by any nasal condition which does not give rise to discharge or to obstruction to normal nasal respiration." This statement seems to be undoubtedly true, but do we always take sufficient care to recognize the slight catarrhal discharge from the nasal accessory sinuses and to satisfy ourselves that the current of air is going through all the nose that should receive benefit from its passage?

Many cases of this type come under observation and are allowed to pass from our hands often into those of the charlatan and quack because a sufficient volume of air is going through the nose and there is no appearance of purulent discharge from any of the sinuses.

A. Hartman called attention to headaches and neurasthenia due to affections of the nasal passage, and says in a large portion of cases that the headaches are due to insufficient oxygenation of the blood and accumulation of toxins in consequence of the mechanical obstruction of the nasal breathing. This statement contains much of truth, but does not cover all classes of cases that make the most difficulties in our dealings with the subject, and presupposes the condition to be an insufficiency of air passing through the nose, hence there is an actual and marked obstruction of nasal respiration.

Kate W. Baldwin, in Laryngoscope, 1906, speaks of the class of patients whose symptoms cause them to seek the oculist and are treated by many physicians before finally having the conditions corrected by proper rhinological work.

It is not the purpose of this paper to go into the many different forms of reflex trouble which may be caused by diseases in the nasal fossa or its accessory sinuses, but merely to deal with the class which present few if any symptoms referable to the nose, and try to elicit some discussion that may throw further light upon this class of cases which seem to have received an insufficient share of our attention.

It is not an unusual experience for the oculist to have a patient present himself with the statement that he has been to many oculists and received glasses from each, but the benefit to his condition of intense headache following near use of the eye has been slight if any. As an earnest of his statements, he will show a dozen pairs of glasses, differing but slightly in their strength, and state the

names of men whose reputations are such as to convince that the work of refraction has been carefully and conscientiously done, yet the suffering of the patient has not been eliminated.

This class is not a small one, and should not be allowed to continue its suffering without other aid than such as is offered by the innumerable so-called headache remedies and analgesics which fill the shelves of our drug stores.

Careful surgical correction of the deformed nasal septum will give great relief and restore once more to the sufferer, not only the ability to perform eye work in peace and comfort, but also his confidence in the ability of the medical profession to cure his pain by getting at its cause, which confidence has been subjected to a severe test by the many failures which have occurred in his case.

The following cases taken from a considerable number, will serve to illustrate the points here made and indicate the results which may be gotten.

CASE 1. Dr. ——, a dentist from Bluefield, W. Va., consulted me November 1st, 1911, with the history of having consulted many oculists on account of his inability to attend to his work with comfort or do any reading. He had been given various glasses and told that the gold with which he filled his patients' teeth caused eye symptoms in many dentists. Just before coming to me, his physician told him that his trouble was in his nose, and if he had that corrected he would be much better. Upon examination of his nasal chambers, I found full space in his inferior meatus; there was a deviation of the septum to the left high up impinging against the left middle turbinate, which was hyperplastic, and a part of the anterior portion had been removed before coming to me. A submucous removal of a part of his septum restored him to health and enabled him to pursue his work, free from headache and also the dizziness which leaning over his patients had formerly caused him.

CASE 2. Mr. M., college professor, consulted me a number of times about his eyes. Having headaches following the use of his eyes and distinctly traceable by him to eye work, as he never suffered from such pains during his period of rest, provided he did not do any reading at such a time. Careful refraction of his eyes on two different occasions failed to give him the amount of relief which he sought, though his refractive error was a marked one, and he suffered with less nervous irritability as a result of the use of his glasses. Rhinological examination showed a deviation of the nasal septum high up in the ethmoid region interfering with the passage of the air current to the roof of the nose and causing pres-

sure upon the middle turbinate. A submucous resection of the nasal septum gave relief from his suffering, and he is now doing post-graduate work in one of the northern colleges and using his eyes with comfort.

CASE 3. Miss J., employed in a tobacco factory, consulted me about her eyes in January, 1912. Refraction showed a very marked error, for which glasses were prescribed, but failed to give the relief sought from the headache, though she said she was very much less tired at the completion of her day's work, and that she felt that the glasses were of benefit, though the use of her eyes still caused her headache from which she was free when not using her eyes. Rhinological examination showed antero-posterior deviation of the nasal septum extending up into the middle meatus, making pressure on the middle turbinate. Correction of this by submucous resection in the nasal septum, while it was followed by some perforation, resulted in absolute relief of all of her symptoms, and ability to continue her work with entire comfort to herself and at night use her eyes for reading or such other near work as she might desire to perform.

CASE 4. Miss H., school teacher, of Burkeville, Va., consulted me in August, 1912, on account of headaches and conjunctivitis following the use of her eyes. Examination of her refractive condition showed an error which was corrected by glasses with some relief of the eye strain and conjunctivitis, but the headaches persisted whenever she used her eyes. In November, a submucous resection of her nasal septum was done, and she now reports herself as working and using her eyes with perfect comfort, a thing which she has not done for many years before.

The above cases are taken merely as examples from a considerable number; in all of them except Case 3, the deviation was confined to the upper part of the nasal septum, and in all, including Case 3, there was ample space for respiration in the inferior meatus. In none of them was there any purulent condition of the sinuses, though all had chronic catarrhal sinusitis.

All of these patients referred their suffering to their eyes as a cause, and upon examination, a refractive error quite sufficient to cause the asthenopia was found, but wearing the proper glass did not give relief until the nasal condition was corrected.

Are we going to let this class of cases continue to suffer or shall we study more carefully and fully the supposed cases of refractive error that glasses fail to relieve?

DISCUSSION.

Dr. Curtis, of New York City, said: We have heard a great deal of late years with regard to resection of the septum. It happened to be my misfortune to start in New York in 1882-1883, enlarging the nasal cavities by the use of chromic acid and the knife, and one of our foremost laryngologists said that he thought I ought to be put in jail. It was the most ridiculous thing he ever heard of—tampering with the nose. My operations (and I tabulated them up to five thousand and then stopped) were not of the submucous variety. In many cases relieving the inferior meatus causes the middle turbinate to diminish. I found that the great channel of respiration restored to its proper lumen and performing its proper function in giving a more ample air supply would often change the appearance of the middle turbinate, and that an anticipated operation was no longer necessary.

The Doctor speaks of the resection of the nasal septum. I would like to have him tell me how much, and I would like to have him define more exactly what he does when the erectile tissues on the septum press against the outer wall and make the passage of air through the fossae obliterated or obstructed. I have found in many of those cases that passing a trephine through that erectile tissue, the often miscalled tubercle of Zuckerandl, taking it off one side of the septum at a time, and allowing a new mucous membrane to grow over the wound is amply sufficient without a resection of the septum. I have today several very piquant noses (with the tips turned up) as the result of enthusiastic operators' manipulations. The pendulum has swung a little too far I think we are beginning to see that excessive surgery in the nose is unnecessary, and I think that we should deal more gently with that poor, maltreated organ in the future. I am not operating as radically as I did, but I am operating much more rapidly than I did when I was so thoroughly denounced for operating upon the nose.

The Doctor has spoken of the indications for submucous resection of the nasal septum, but he has given us chiefly the eye symptoms. In Dr. Hamilton's book on headache, published in 1887 or 1888, he said he had had referred several cases of headache to me as a rhinologist, which had been cured by a very slight operation in the nose.

I find the stomach is often favorably affected by a nasal resection. On our pulmonary cases at the Nose, Throat and Lung Hospital, we are very careful in operating, for tubercular ulcers have sometimes followed nasal operations. I think with proper antiseptic precautions this might have been entirely avoided. The gain in weight of a tuberculous patient after a nasal resection is often pronounced. No accident has ever followed an operation in my own practice upon a phthicical subject, and I only cite this contingency as a possibility.

Dr. White, of Richmond, Va., asked if he understood Dr. Miller to state that headache was rarely found without obstruction and without discharge from the nose?

Dr. Miller: Yes. I was making a quotation.

Dr. White: I would like to take issue on that statement, because in the article that I wrote in Burnett's System of "Diseases of the Ear, Throat and Nose," on "Neurosis of the Nose," I called attention to the fact that headache, outside of ocular causes, was frequently due to pressure in the nose, without any discharge or obstruction whatever, and further observation of others as well as my own experience confirms this statement. I have done a great many operations in the nose, just as Dr. Curtis has, trying to relieve points of adhesions by cutting them through with forceps and other means, but the great difficulty I have had to contend with was to keep them apart after I had done it. Only a day or so ago, a lady who lives in Buffalo, New York, came to my office complaining of headache, reflex pain in the

nose, etc. I found she had very dense adhesions between the septum and middle turbinate, and I suggested that might be the cause of her discomfort. She said, "Dr. Rowe has been operating on that for about twelve months and he thought he had succeeded in getting rid of it." (She was not under his observation at the time). As far as I could gather from her report, she had denser adhesions than when she started. If I can get along without the resection of the septum, I do so. If I can get rid of the pressure and obstruction in some other way, I do not do the resection. But there is no question about the great advantage of resection of the septum, where you have contact between the outer wall and the septum, as in this way you can keep the two sides apart, no matter how well you separate them; otherwise re-adhesions take place. If you make the septum pliable by a resection, you can keep the two sides apart with much less difficulty.

Dr. Roy: About eight years ago, Dr. Sluder, in connection with Dr. Ewing of St. Louis, read a paper at the meeting of the American Ophthalmological Society in which Dr. Sluder called attention to the swelling of the bulla of the ethmoid, producing a certain amount of pressure causing many obscure eye troubles, and especially discernible or demonstrable by pressing close in over the region of the anterior end of the middle turbinate on the outside. Dr. Ewing stated that these cases had come to him time and time again, and he had not been able to relieve them by eye treatment, and finally he sent them to Dr. Sluder, who found the swollen condition of the bulla of the ethmoid. At that time I took part in the discussion and made the statement that I had looked very carefully for this condition and had been unable to find that such existed in the nose, and that I had never been able to trace a very close relationship between those diseased conditions described in the nose, as the cause of reflex eye symptoms; and I think Dr. Ballenger, at that time, took issue with me and said I had not looked carefully enough, as he had seen them often.

In my history books I have refracted over 8,000 cases, and have been very careful to look into the nose for any nasal abnormalities.

I told Dr. Sluder I would like for him to point out such cases and demonstrate to me so that I might not overlook them. I went to his office and he happened to have a case from Missouri, and he told me the case had come in the day before and was almost a typical case. So I examined this case with Dr. Sluder. Went into it thoroughly, looked at it from all standpoints, examined thoroughly the middle turbinate. We shrunk the tissues and I looked at it from every angle and every way. Dr. Sluder saw it, but I have never been able to see it. I think it is the enthusiasm a man may have for a condition.

As I say, I had 8,000 cases of refraction that I have examined and went carefully into the nose, and with the exception of one or two cases, have never been able to demonstrate to my satisfaction that the pressure from deviations of the nasal septum was the cause of the eye symptoms. When I was not able to relieve them with correcting the refractive error, I have not been able to correct any of those reflex conditions by finding certain reflex conditions in the nose. Where you have an acute frontal sinusitis or ethmoiditis you have these conditions right along.

Dr. Ballenger: I have seen many cases that have been referred to me by oculists who have failed to give the proper correction with glasses, (and very good oculists they were, too, and among our best Chicago men), where I could do a middle turbinate operation and correct the ocular error. Relieve the contact and pressure and they can immediately, or in a month or so, go back and get glasses that are perfectly satisfactory and remain satisfactory. I have had at least one hundred cases of that kind that have been relieved. Then I have had other cases in which there were perhaps demonstrable obstructive lesions more apparent than those referred to, in which there was a

sinus disease and eye disease, including complete blindness, which intranasal operation relieved by the restoration of sight. In the older cases only partial restoration, and in the very advanced cases of blindness, no relief whatever. These are cases where there is apparently no obstruction, yet where there is a pressure between the turbinate and the septum.

I think there is much more in my text book than Dr. Miller quotes, about this condition, and that it is emphasized perhaps a little more than he has done in his paper, although I may have forgotten. I have been criticized for saying what I have said, because some of the oculists do not believe these reflex symptoms due to the nasal conditions. So I am not sure. It may be due to enthusiasm,—but the patient gets results. What we are for, after all, is not to practice science exclusively; we want to relieve our patients; but if by science, or whatever it is, that patient gets relief, they are glad to pay us to be relieved of their symptoms.

Dr. Martin: I have had nothing like the experience that the distinguished gentlemen who have discussed this paper have had, but my limited experience has taught me that pressure between the septum and middle turbinate will cause headache. The thorn in my flesh has been what operation to do. When I first began to do this work, we did nothing but turbinate operations, and in those days operating on a middle turbinate was quite a problem. As soon as the submucous operation came out, I went to it at once, but have had some unsatisfactory results.

Since the introduction of Dr. Ballenger's sickle knife, I have gone back to the amputation of the middle turbinate rather than a submucous operation, and I don't know whether I am right or wrong, from the standpoint of the conversation of the patient,—whether to do the turbinate operation or the other. But the turbinate operation is so easy I have almost quit doing the high submucous operation.

I think a large number of these headaches are due to pressure up there, and if you look there you may not see the pressure at all times, but by using the adrenalin and cocaine and shrinking the tissue, you will still find points of contact. The question is, should one sacrifice the entire turbinate body?

As to the eye cases, I find probably 20 per cent. of my works are not relieved after I have corrected their refractive error, and mostly in children. I know children from six to twelve years of age very often have a muscular insufficiency, but not enough to account for the headache; then I look into the children's noses and find this point of contact and don't know what to do. Sometimes I operate on children and have never had occasion to regret it; but I always feel a little bit guilty when I take out a turbinate in a child, and a submucous operation in a child is almost out of the question. The condition is there,—but what to do for it?

Dr. Stucky: I think sometimes we forget that the nose is the barometer of the body. The first evidence we have of any systemic infections or disturbances is in the nose. Now, personally, I have almost ceased to relieve these pressure points by removing the septum. I would much rather relieve the pressure by removing that offshoot of the ethmoid, the middle turbinate, than to sacrifice the septum. I think many of these cases of headache due to a combined obstruction, and to relieve any one, alone, does not relieve the whole trouble. I think if the last speaker will look after the diet of the children, especially those under fourteen years of age, he will find the nose condition will very speedily subside. I think there is danger of our doing too much surgery of the nose in children. From the age of twelve to fourteen, both in the male and the female, we have all sorts of nasal hyperemia and all sorts of psychic disturbances, headaches, and so on. Long ago I quit removing the turbinates of a child under fourteen.

Dr. Ballenger: As to whether you should choose the correction of the deviation of the septum, turbinated body, or a portion of it, I have done both. Of course sometimes I do one, and sometimes the other. It is sometimes difficult to correct the high deviation of the septum. You think you have removed it and yet there may be a little of it projecting out which will still hold the mucous membrane against the middle turbinate and will not bring relief to the obstruction. I think it best to relieve the septum alone and remove the middle turbinated body, and what surprises me is this: that in cases where there is no apparent contact of the middle turbinated body, after the turbinated body is removed in its entirety, if you will examine it you will see a flat facet showing where it has pressed against the septum. Upon looking into the nose, you will not suspect such contact, yet upon operation you will find the septum have been long in contact with the middle turbinated body. When I look into the nose and see no apparent contact of any consequence, I try to pass a delicate probe between the septum and the turbinate, and I cannot do it. Hence we should choose either the middle turbinate or the septum, and operate according to our best judgment. If the lower part of the septum needs to be operated, for other reasons than these ocular symptoms, then perhaps you had better do the high operation with the low operation, and try to relieve the eye symptoms and relieve the middle turbinate pressure. With only the high deviation, I believe it much better to remove the middle turbinated body, as it is much more sure to give results. I do not find any great harm in removing the middle turbinated body. I have removed over 1600,—approaching 2000, perhaps, and but rarely seen the effects that my friend from Philadelphia speaks of. If you remove the turbinated body, a few weeks later tissue springs up and partially fills up the space that was previously filled by the turbinated body, and does not leave a "hole in the face" except for a very short time.

Dr. Miller closes: I am very much obliged to the gentlemen for the discussion. I wrote the paper for discussion and bringing out some more about this subject. I purposely confined myself to the very narrow field of cases where they do not get relief by use of proper glasses. I have, over and over again, seen these cases of catarrhal inflammation of the ethmoid, where there was headache, apparently typical of eye strain, and that cleared up after properly draining the nose.

Dr. Curtis spoke of the submucous operation in obstructed respiration. I confined myself to the high deviations, not the low ones. In the cases I reported, there was quite a sufficient volume of air going through the inferior meatus. How much toxemia there was, I do not know, but the inferior meatus did not give any relief, though it was open and free. The erectile tissues I did not deal with. I have had a number of such cases. I wrote a paper some years ago dealing with erectile tissues of the septum. There had been some slight catarrhal infection of the mucous membrane, causing pressure, but that was not the point; it was direct deviation, one side being in contact with the turbinate, one side thoroughly opened. There is usually some hyperplasia upon both sides, but this one side in the region of the middle turbinate was absolutely open and free from contact. You could pass a good big probe all between it on the other side, but there was a deviation, leaving a contact upon the opposite side. Of course, some of the cases I did the submucous resection in. I just hated to sacrifice the turbinate, for some reason. I never had any experience where harm was done by doing it, but I thought it better to sacrifice the hard layer of the septum, and leave the turbinate with its membrane intact, and it always leaves you the possibility of relieving without sacrificing this turbinate. If you take the turbinate you can never

get it back, and of course you can operate on the septum, if necessary, but if you are going to have to do two operations, in my opinion the septum operation is the better to do first.

Dr. White speaks in his remarks on reflex neurosis. I don't believe, if you make a careful search, that you could have any long-continued pressure in the nose interfering with aeration and drainage there for six months or more, unless you have some catarrhal trouble. If that mucous membrane is not properly dried with every intake of breath, you are going to have hyperplasia causing all the reflexes, it is true: but if you look fully enough, you will find some little—one or more—cells of the ethmoid with some catarrhal inflammation.

I believe Dr. Ballenger did say more about the eye in his text-book than I spoke of there, but that is so emphasized that I jumped on that particularly. I have read that through seven or eight times in seven or eight years. Dr. Martin agrees with me about his experience with nasal operations for relief of headaches, but as I say, I prefer to do the septum operation first, and it may have been that when I first started doing them I did them to get my hand in, having done a good many turbinate removals, and after I got my hand in I liked it better; but as a rule I have selected the septum operation.

Dr. Stucky's very apt remark about the nose being the barometer of the body in the digestive troubles is certainly true; then, again, even in these digestive troubles, we sometimes overlook one or two points when there is some nasal obstruction. In dealing with children one of the causes for dealing with digestive conditions—one of the most frequent causes for soft hyperplasia in the nose of children, where you have no deviation particularly, you have a hyperplastic nasal turbinate, the nasal passage clear of adenoids, still you don't get the proper respiration and the upper jaw is in proper condition; the digestion is upset, the physician has done everything he could for the digestion, apparently, and therefore refers him to the rhinologists, thinking the condition due to the nose. We go back of the nose to the alimentary canal and make a careful search for pin worms and find that is the trouble. Each time the alimentary canal is swept out carefully, and taken care of for a week or two, the patient is much better; then back come the same symptoms that the family physician has insisted are due to the nose, but he has forgotten the existence of these pin worms in the large intestines. As soon as the system is relieved of them, the rhinological condition clears up.

CONSERVATIVE OPERATIONS FOR PAN-SINUSITIS WITH NEW INSTRUMENTS.

By W. PERRY REAVES, M. D., Greensboro, N. C.

Endo-nasal surgery is divisible into three heads.

First. To remove or correct abnormal anatomical parts that obstruct its normal physiological function or produce pressure with pathological symptoms of pain.

Second. To remove pathological tissue that gives the above named symptoms with or without an excess of mucus or pus.

Third. Sinusitis or pan-sinusitis is usually associated with the conditions found under the divisions 1 and 2. These conditions if not the exciting cause have prevented a spontaneous cure of the sinusitis that has developed from colds, grippe, examthematous fevers, etc., (maxillary sinusitis from dental causes excepted).

The most rational way to cure anything is to remove the cause; if the cause or a contributing cause of sinusitis is found under Nos. 1 and 2, then its correction is a part of the operation for the cure of the sinusitis, such as submucous resection of the septum, removing parts of the turbinates or ethmoids, or any pathological tissue to re-establish the physiological function of the nose. Then make openings large enough to drain and ventilate the sinuses. This double force of drainage and ventilation will effect a cure in practically all the cases that are not continually re-infected by another sinus or a hidden cell, provided the bone is not necrotic or the tissue malignant.

If the above conclusions are true then conservative operations that are radical enough to effect a cure by drainage and ventilation, are those that expose the patient to the least danger, pain and nervous shock, and maintaining as near as possible the physiological function of the nose.

The viscous circle described by Dr. Ballenger as the "key" to sinus diseases, to me it is the lock that closes their door and has its combinations like the lock to the outer door of a safe, that must be opened before the key to the deposit boxes are accessible. The first turn to this lock is to remove the anterior tip, or half of the middle turbinate, the next part, or all of the anterior ethmoidal cells and in some cases part of uncinate process and bulla ethmoidalis. Then we have access to the keyholes of the

maxillary and frontal sinuses which must become an open door for drainage and ventilation to effect a cure. The key best suited to open these doors must be small enough to get into the nose, curved enough to pass through the keyhole which is at a right angle to the anterior nares, and cuts in every direction, in order to break down the door at the most desired place for drainage and ventilation. This I believe I have accomplished in this instrument which has been described in the Journal of the American Medical Association, Dec. 16th, 1911, entitled "A New Sinus Punch." This improved model has the cutting edge at a right angle to that of a straight biting forcep, meets the requirements to enlarge the natural opening, first, small enough to get into the nose; second, curved to a right angle with the cone tip which facilitates the entrance into the antrum; third, cuts in every direction; fourth, strong enough to remove the antral wall and part of the uncinate process, bulla ethmoidalis and encroaching anterior ethmoid cells, which when diseases if left are a source of infection, especially when the opening has been made under the inferior turbinate. In most cases to enlarge the maxillary opening back to the posterior wall of the sinus and junction of the inferior turbinate, will give ample drainage and ventilation to effect a cure, the granulation can be nibbled off from time to time until the inflammatory condition has subsided. Should the antrum be low and inferior turbinate high the opening can be enlarged downward, cutting through the inferior turbinate, continuing the opening under the turbinate; this has a decided advantage by leaving the anterior part of the inferior turbinate that is so essential especially when the middle turbinate and ethmoid cells have been removed. This anterior half of the inferior turbinate maintains the relative space of the anterior two-fifths of the nares, and in inspiration there is a tendency to form a vacuum in the antrum when the opening is well back, which is conducive to circulation of air in the antrum during inspiration and expiration.

To Dr. A. M. Anderson of New York I am indebted for the suggestion to use the small punch to enlarge the opening of the frontal sinus. This, my first opportunity, I want to give him credit for the work that he had done on a similar instrument at the time the punch was described in the Journal.

In chronic frontal sinusitis the anterior ethmoid cells that form part of the walls of the frontal duct often by necrotic process enlarge the duct enough to receive the cone tip (3½ to 4 mm.) of

the small punch, after the anterior tip of the middle turbinate and ethmoid cells have been removed. In some cases it is also necessary to remove part of the uncinate process and bulla ethmoidetis, then pass the cone tip into the frontal sinus and nibble away the granulated tissue, the cells encroaching upon the duct, and the high ethmoid cells, which often enlarges the opening to 6 mm. in diameter and the punch slips into the antrum. In no case should we attempt to enter the sinus with the punch until the location and size of the duct is ascertained, by probing in those cases found to be too small to enter with the cone tip of the punch, the duct should be enlarged forward and laterally by Goode's rasps, then the operation is completed by the punch.

By careful study of the formation of the posterior wall of the frontal sinus which continues backward as the roof of the ethmoid cells you will see from the X-ray pictures that the danger of button-holing this plate of bone with the punch and exposing the dura matter is very remote, and the high ethmoid cells surrounding the duct and blocking drainage can be removed.

In pan-sinusitis a complete or partial ethmoidectomy should be done before enlarging the opening of the middle and frontal sinus. This is done in many ways by different operators, with forceps, scissors, knives, snares, etc. These piece-meal operations have the disadvantage of a bloody field, obscuring the operator's vision, every little bite gives the patient about as much discomfort as a big bite, prolongs the operation, taxing the patient's nervous system, leaving a ragged field with a slower recovery.

Nasal operations are, like any other surgical operations, the cleaner the cut the less the pain, and the quicker the recovery. Ballenger's ethmoid turbinate knife in the hands of one who has developed the technique and has the boldness to use it meets these surgical requirements; to those who have not developed the technique and have not acquired the boldness, is an uncertain and dangerous operator, removing the ethmoid with a sharp instrument that cuts loose the ethmoid body from its roof, which is the floor of the skull, as the operation has to be done more by the sense of touch than by sight.

To overcome the danger of cutting through the roof of the ethmoid into the cranium, I have had made a right angle ethmoid knife, (R. & L.) mounted on a curved shank that slides along the roof of the nose as the cut is made forward; this shank is received into the curved barrel as the knife is pulled forward.

The curved barrel at its nasal or distal end has an 8 mm. hook that turns up, down, right and left to engage at the anterior junction of the middle turbinate and the ethmoid or nearer the roof of the nose by removing just above this point some ethmoid cells with straight biting forceps. The curved shank facilitates the passing the right angle blade under the middle turbinate to its posterior attachment, the hook may be left unlocked if the nose is close and rotated to the desired position by a probe or forceps after the instrument has been introduced into the nose, then the hook is anchored at the interior end of the ethmoid and the knife at the posterior end. The curved shank is high up in the nose, the shank of the knife slips into the barrel exactly like the wire in a snare and the handle of the instrument works exactly like the handle of a snare, thus the hook grasps the ethmoid as it were and holds it as the knife severs it from its posterior and superior attachments. This requires very little force and the patient does not have the sensation of something being pulled out. The curved shank carrying the knife at a right angle is the excuse for presenting this instrument. The knife cannot cut higher than the shank, the shank cannot go higher than the roof of the nose, and the roof of the ethmoid is a little higher than the roof of the nose, which eliminates the danger of cutting through the roof of the ethmoid. The ethmoid may be severed high or low by moving the handle down or up as the knife is pulled forward. The ethmoidectomy is completed by cutting the cells loose from the orbital plate with forceps, scissors, knife, with or without the snare.

In those cases where the septum is deviated or the middle turbinate or ethmoid obstructs the nose so that the shank cannot be passed to the roof of the nose, I have had made small alligator forceps cutting right and left, with the cutting part bent down 35° from the shank which, when introduced into the roof of the nose, is parallel to its roof; with these punches an ethmoidectomy is just the reverse, beginning at the anterior ethmoid cells cutting them loose from the cranial plate from before backwards, then completing the operation as before. The sphenoid sinus is now accessible and can be opened with any of the straight sphenoid punches.

The last chapter in nasal surgery has not been written, nor do I contend that these instruments have solved the obstacles in sinus surgery, but do believe that their mechanical construction are such to meet the surgical requirements to drain and venti-

late the sinuses, minimizing the danger, pain and shock to the patient, enabling the operator to leave the inferior turbinate, in pan-sinusitis the only tissue that can be left on the operated side that is not pathological. In maxillary sinusitis, either acute or chronic, the opening can quickly be made with the large punch under the inferior turbinate, when the viscous circle is not pathological. The alligator forceps will be found useful in removing part or all of the middle turbinates.

DISCUSSION.

Dr. Ballenger, of Chicago, Ill., said: I have always said that my operation is attended with some degree of danger in the hands of a man that does not understand it. In my hands, and in the hands of some others, it works out all right, as I have done several hundred without untoward results. Dr. Mosher's method is good, but it does not remove the tissues en masse as may be done by my method. This is my chief claim for my technique, namely, that at the end of the operation you have a good gross specimen, the examination of which will afford very interesting and instructive information. In all other methods the tissues are removed piecemeal.

A CONSIDERATION OF SOME OF THE LOCAL ANESTHETICS.

By LELAND O. MAULDIN, M. D., Greenville, S. C.

Like a great many who follow in the trail of a specialty, my daily routine of practice brings me frequently into a consideration of the use of a local anesthetic, and no doubt you will agree with me in the statement that the question of local anesthesia is of such far-reaching importance that it touches practically every branch of the medical profession, therefore it shall be my endeavor in this paper to induce a discussion from this body that embraces an elucidation of experienced men on this subject and at the same time express to you in my humble way some facts as I have elicited them about some of the drugs that are classed as local anesthetics.

The local anesthetics most commonly used are cocaine, eucain, novocain, alypin, ethyl chloride spray, and quinine in some of its salts.

In their use, we should keep clearly in mind the fact that the local anesthetic of choice is not always the same drug, for the choice should depend greatly upon the particular operation to be performed and upon the general condition and idiosyncrasy of the individual to be operated upon.

A great deal of research has been done in the past few years by the German scientists, especially in the development of local anesthetics, and yet in the present state of our enlightenment on the subject it seems that there is yet a reasonable demand for the discovery of a local anesthetic that will produce a minimum degree of toxicity and a maximum effect of anesthesia with no irritation or sloughing. This, of course, is the ideal aimed at in local anesthesia.

Among some of the drugs that have been introduced as cocaine substitutes, I would mention besides those already mentioned, nurocain, akoin, holokain, tropacocain, orthoform, nirvanin, adralgin, subcain, andolin, udrenin, perinephrin, orthonal, aneson, subcutin, dolatin. In passing it is well to mention that a great many of these substitutes are cocain derivatives and mixtures of highly poisonous substances with no definite strength, and cannot be relied upon.

Cocaine is perhaps the most used of the local anesthetics, and the anesthetizing property of the others mentioned is usually measured by its cocaine equivalency.

The more one uses cocaine in practice, the more thoroughly he is impressed with the fact that it is a drug to be studied from a synthetical standpoint, from the standpoints of compatibility and individual susceptibility, and from the standpoint of the patient's condition when the drug is administered or applied.

Cocaine is used in solutions of varying strength from 1/20 of 1 per cent. to 20 per cent., and sometimes even in powder form.

I find in nose and throat operations under local anesthesia that two to ten per cent. solution of cocaine after its combination with adrenalin solution will accomplish about as good results as the very strong solutions,—the strength depending somewhat upon the depth of anesthesia desired.

In combination with adrenalin or adnephrin solutions, the systemic absorption of the drug is limited, the anesthesia is some longer in duration and is circumscribed to the area of operation.

The physiological compatibility of cocaine with adrenalin solution then is a factor to be considered in the administration of the drug, for the adrenalin solution certainly assists in the accomplishment of four very desirable results; viz., lessens the maximum systemic absorption of cocaine, circumscribes the area of anesthesia, prolongs its duration and prevents excessive hemorrhage.

At present I do not consider it good surgery to attempt to do a mucous surface operation under cocaine anesthesia without the use of adrenalin or adnephrin in combinations with the anesthetic to modify the systemic absorption.

In patients with very high or very low blood pressure, or with known valvular lesions, I hesitate to use cocaine solutions, especially if they are to be used about the head. In such cases, if a local anesthetic is positively indicated, I have used novocain with gratifying results. Novocain has quite a lengthy chemical formula, —C00.C_2H_4.N(C_2H_3)2;HCL., with a much longer synthetical name. P. Aminobenzoyldiethylaminoethanol.

It crystalizes from alcohol in colorless needles, possessing a melting point of 156 degrees C. It dissolves in an equal part of water, making thereby a neutral solution. In cold alcohol it dissolves in the proportion of 1 to 30. It acts on the peripheral nerves in the same way that cocaine does. It is six times less poisonous than cocaine, but the same strength solution has a slightly less equivalent anesthetic property. Unlike cocaine, it produces no mydriasis

and no disturbance of accommodation when used in the eyes, and like cocaine, it is more effective when used in combination with adrenalin or adnephrin solutions, and is non irritating.

Were its anesthetic property equivalent to that of cocaine we should say that novocain approximated our ideal of a local anesthetic, but this is not the case, yet it is my anesthetic of choice where extensive mucous surface is to be anesthetized, where foreign bodies are to be removed from the cornea, and in eye operations where dilatation of the pupil is not to be desired; I also choose it when local anesthesia is desired in very young children or in the very aged or where a more poisonous drug would start a downward trend in the patient's vital economy.

Eucaine is five times less poisonous than cocaine.

It does not dilate the pupil when used in the eye, but is irritating and has been known to produce sloughing with tendency to gangrene when injected into tissue; therefore it is not an anesthetic of choice, and for the reason of its irritating property it should be cautiously used.

This drug is most frequently used in one to ten per cent. strength solutions.

Ethyl chlorid spray for small skin and superficial glandular operations is the anesthetic of choice, especially if the patient is weak with high fever and rapid pulse, as is frequently met with in glandular abscesses accompanying tuberculosis. This can be used also to advantage in quick tracheotomy, but I do not know where it can be properly used in mucous surface operations.

Alypin is a local anesthetic used by some in minor surgery operations as a substitute for cocaine. It is recommended in solutions from one to five per cent. strength, but on account of its accredited irritant property it is not as much used now, as it was when first instituted. It is not more than two times less poisonous than cocaine, so there is very little necessity for its use.

Quinine salts, especially the urea hydrochloride, are highly lauded as local anesthetic on account of their non-poisonous effect.

A strong solution of the quinine urea hydrochloride applied to the mucous surface slightly benumbs it; if injected into tissue it will accomplish its maximum benumbing effect. Some of the anesthetic effect is doubtless due to pressure. The time it takes to produce anesthesia is variable with different individuals, but it is usually about one half hour. When it does take effect it has been known to last seven to ten days, for this reason, though anesthesia be not

as thorough as with cocaine and other drugs, it is good to use in surface operations where edema from infiltration of tissue is not a factor to be seriously considered.

After mastoid operations under general anesthesia, it has been uesd to advantage by injecting around the site of operation to prevent pain in future of the wound and in dressings.

It is not advisable as a rule in throat operations, as considerable has to be injected in order to produce anesthesia, and from this there is danger of excessive infiltration of tissue, producing excessive edema, a thing by no means to be desired in the throat.

Without the urea element, quinine has been used in combination as follows: Acid Carbol 30 Grs., Menthol 30 Grs., Quinine Hydrochloride 24 Grs., and adrenalin 1/12 of a grain, with marked beneficial effect on painful mucous areas. A few drops of this solution is applied to the swollen area by means of a cotton swab.

The same applied to a drum membrane will allow paracentesis performed without pain.

The same with precautions applied to a tuberculous throat will allow the patient to swallow with more ease.

DISCUSSION.

Dr. Bird: I am interested in what Dr. Miller says, but never have found local anesthetics that would influence the inflamed drum membrane. I have seen almost everything tried, but when it was necessary to prevent mastoid complications, I have found it necessary to use a general anesthetic; and if any of the quinine preparations would have that effect, I would be glad to know it.

Dr. Miller: I must say that I have tried most of the anesthetics, and every time I come back to cocaine. In local superficial application, I use cocaine in powder form and rub it on. I wring my swab out in one of the preparations of the adrenal body—most any of them—and dip it into the powdered cocaine and rub it on, and have never found any toxemia from using it in this way. I have had toxemia several times before I adopted this method, by wringing cotton out of cocaine solution, even as high as 20 per cent., and leaving it in the nose to produce local anesthesia. I have produced toxemia in my patients, but in those patients I have afterwards used the local application of crystals of cocaine, and have had no toxic conditions whatever. Cocaine is absolutely certain in its effects. I have never found the same result from any other. I have used eucaine, novocaine, and holocaine. They, with cocaine, have been my experience with local anesthetics, with the exception of orthoform. This stops pain after operation, and unless there is an idiosyncrasy I have every time come back to cocaine. I use the cocaine itself on a swab wrung out of one of the preparations of the adrenal bodies, and in several hundred cases since I have been using it have had absolutely no toxic effects, and I have done all sorts of operations, submucous resections, and so on. In tonsil operations, the strength of cocaine we use I expect produces an effect; but all of us know, and the general surgeons will tell you the same thing from their own experience, that a certain amount of surgical work can be done with the injection of water,—merely the

effect of the pressure upon the terminal filaments of the sensory nerves; so how much we are getting from the fluid, and how much from the ½ to 2 per cent. cocaine is a question. Of course, when these solutions are made with carbolic acid as a preservative, we have the still further action of the carbolic acid. So far as opening the tympanic membrane is concerned, I have had very satisfactory results from putting a drop or two of carbolic acid and cocaine on it, and that gives me as good an anesthesia as I want, usually. Cocaine is my stand-by, and every time I have used the other drugs, I come back to it.

Dr. Kirkpatrick, Selma, Ala., used alypin quite extensively for six or eight years and finds it one of the most dependable things we can use for hypodermic use. You know what trouble dentists have with anesthesia. Their trouble is toxemia and sloughing. I have taught the dentists at home to use alypin, and they are charmed. It is less toxic and equally as anesthetic as cocaine. I do not think there is ever any excuse for using cocaine hypodermically. I use it by rubbing it on, but where it is necessary to inject it into the tissue I use either quinine salts, quinine urea or the alypin. I have never seen the edema following the use of quinine and urea hydrochloride that has been ascribed it, but one serious objection to it is the time it takes. If one is rather busy he has to wait too long. In those cases I use alypin and use it very freely. I unhesitatingly inject a hypodermic syringe full into each tonsil, and have never seen the least toxic effect from it.

Dr. Martin: I would like to give Dr. Bird my experience of several years with a method which I devised for a painless opening of the drum membrane. First I take cocaine crystals and add just enough water to dissolve them, making a sort of paste. This I apply against the drum membrane for five minutes with a cotton pledget; I then dip an applicator rolled with cotton in 95 per cent. carbolic acid, and with this make a white streak on the drum membrane just where I want to make my incision. The patient complains of the carbolic acid burning for a moment only. You can then make a painless incision in the area anesthetized by the carbolic acid.

Dr. Hedges: We have been using from one-half to one per cent. novocaine in tonsillectomies, and it has given no toxic effect, so far. I am afraid to inject cocaine in tonsil work, but novocaine has been very satisfactory to us.

Dr. Curtis: I have had some experience with alypin. In just about fifteen minutes, alypin will lessen very much the ordinary earache, and relieve the painful situation until we can get there.

In paracentesis I give nitrous oxid gas in my office. I have never tried making an incision with carbolic acid. I once put carbolic acid inadvertently into a gentleman's ear, but luckily had some absolute alcohol at hand and applied it immediately, and the patient never knew of the mistake.

I think it is a valuable point if, by putting the pure carbolic just wide enough for the incision, we can accomplish a painless paracentesis, but I would suggest extreme caution as to its employment.

Dr. Mauldin, in closing the discussion, said: In answer to Dr. Bird's question, will say I have used this preparation of carbolic acid and menthol and the quinine hydrochloride in about equal proportions, with a little of the adrenalin in it. This combination acts very satisfactorily. I do not know whether the anesthetic effect is due to quinine element of the combination or to the carbolic acid or to all the ingredients combined. I have found this to be a very safe combination and one that will produce the result desired. I do not favor

the introduction of quinine salts into the tonsil operation. I have never tried it, though. I believe that the quinine would be irritating and in some instances cause sloughing, and in many cases edema, on account of the fact that a large quantity has to be used.

I find that the novocaine acts very nicely injected into the tissue in those cases. It is about six times less poisonous than cocaine, has almost the same anesthetic effect as cocaine and used in connection with the adrenalin acts remarkably well, and I think that novocaine will be used a great deal in the future. As to allopin, I have not had the opportunity of using so much, so cannot speak authoritatively about it.

MEETING OF THE WESTERN SECTION, HELD IN OAKLAND, CALIFORNIA, APRIL 15, 1913, UNDER THE CHAIRMANSHIP OF DR. HILL HASTINGS, OF LOS ANGELES.

TONSILLECTOMY IN THE UPRIGHT POSITION UNDER ETHER.

By W. H. ROBERTS, M. D., Pasadena, Cal.

The position of the patient while being operated under ether for the removal of diseased tonsils is one that deserves serious consideration. As we constantly see and treat the throats of our patients while they are sitting upright, we naturally acquire a familiarity with the relationship of the various structures as thus presented to view, and we attain a manual dexterity in our treatments which a change in the patient's position necessarily lessens. It would seem that tonsillectomies could be more readily performed with the patient in the upright position than in any other, if the patient can be safely placed in the upright position when under ether.

Before adopting the upright position for tonsillectomies under ether, I carefully investigated the possible hazards of this position. I knew that for years it had been the custom of the nose and throat surgeons on the staff of the Massachusetts Charitable Eye and Ear Hospital to do all tonsil and adenoid operations under ether with the patients sitting up in a chair. While there, I had inquired for fatalities following these operations, and I learned they had had none. Personal communications from various friends of mine who had been connected with this hospital were to the effect that there never had been a fatality in Boston that could in any way be ascribed to the upright position.

For the last ten years I have done practically all my tonsillectomies after the manner about to be described, and I have yet to see any unfavorable condition either during or after the operation that could be attributed to the upright position. This position, in addition to the advantage of having the parts in the position in which we are the most familiar with them, offers several other advantages:

1. The ease with which the field of operation can be illuminated, either by an electric head-light, such as I use, or by natural

or artificial light coming from behind and above the surgeon's head.

2. The ready accessibility of the parts to be operated on.

3. The freedom with which an assistant can hold instruments and can sponge the field of operation.

4. The simple control of the hemorrhage at its source, and the prevention of the entrance of blood into the larynx.

5. The thoroughness with which the operative field can be examined for tonsil remnants, tissue shreds and bleeding points after the enucleation.

6. The ease of control of the patient's head by the anesthetist.

The entrance of blood into the larynx during the operation is an objection raised by some to the upright position.

Dr. R. Bishop Canfield, of Ann Arbor, has examined the larynges of many patients operated in the prone, as well as in the upright, position. In a personal communication he says: "There seemed to be no more blood in the larynx after operations in the upright position than after operations in the recumbent position. In no case did the amount of blood amount to much, but appeared more like a stain or a small thin clot. The vocal cords were streaked in some cases; in others, the posterior wall showed a little dry blood. * * * In my experience, there is much less blood in the mouth and pharynx during operation in the upright position than in the supine position. * * * I have never seen any accident that could be attributed to operation in the upright position. This statement covers several thousand cases."

The amount of blood gaining access to the larynx depends on the depth of the anesthesia. The patient should never be so deeply anesthetized as to be unable to swallow the blood and mucous that might collect at the entrance to the esophagus. It is obviously easier to swallow in the upright position than when lying prone. Further, the anesthesia should be so timed that the patient should be partially awake at the conclusion of the operation. As the anesthesia is so important a part of the operation, it necessarily follows that it should be administered only by an expert, and by the one who is accustomed to the surgeon's technique.

The instruments are arranged in the order of their use on a table at the surgeon's right. The assistant stands at the surgeon's left, beside a table containing the sponge forceps which

are loaded by a nurse as required. Another nurse acts as an assistant to the anesthetist.

The various stages of the operation are as follows:

1. The patient is anesthetized in the prone position, and, when thoroughly under the ether, is placed in a chair in front of the

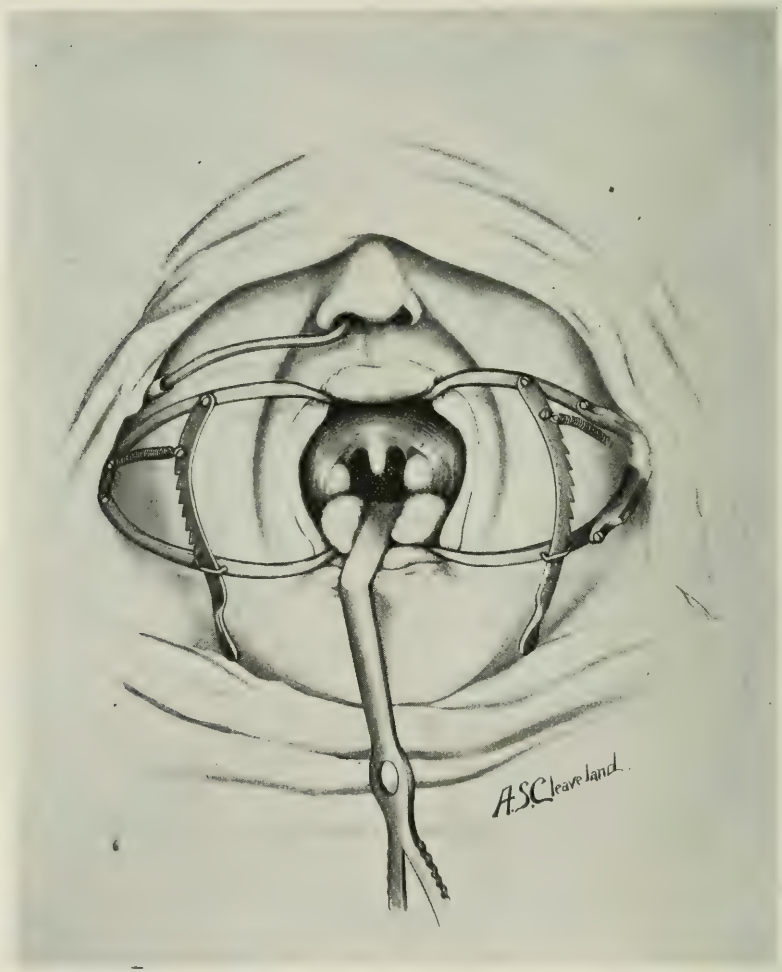


Fig. 1. Whitehead gag in position. Tongue controlled by a separate tongue depressor. Ether administered through a nasal tube.

operator, who is so seated that his head is about on a level with that of the patient.

2. The anesthetist then stands behind the patient, so as to control the head and to continue the administration of the ether

through a tube introduced through the right nostril. A foot pump forces air through a bottle containing the ether, and the vapor is carried by a rubber tube to the patient's nose.

3. The patient is covered from the neck down with a sterile sheet that extends over the surgeon's lap; a Whitehead gag is

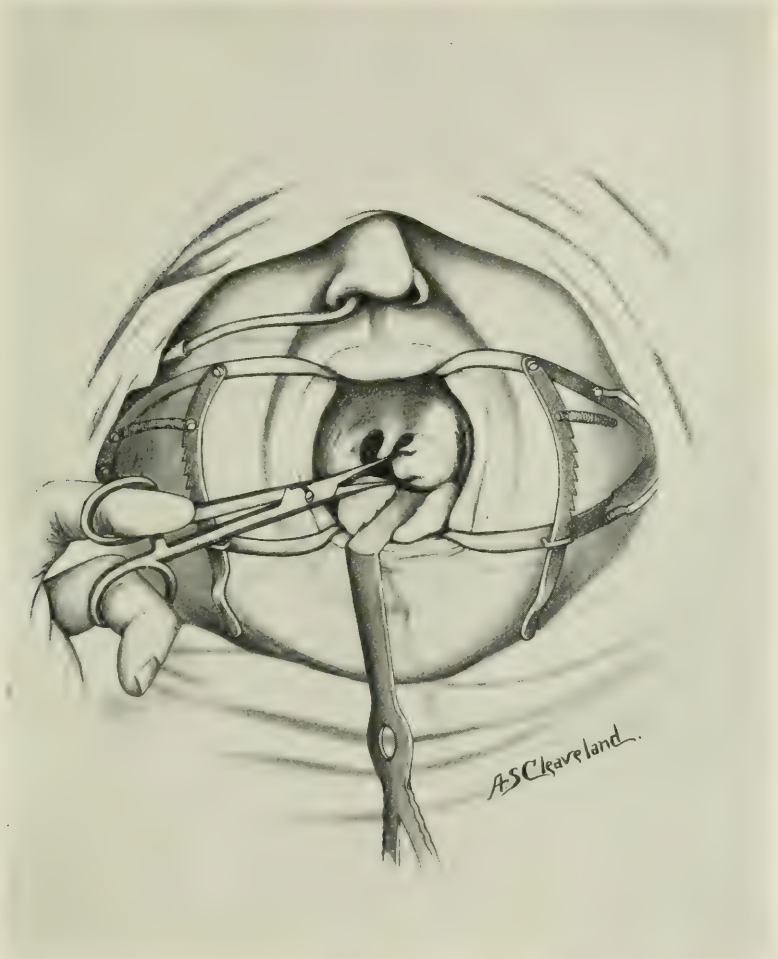


Fig. 2. Traction being made on left tonsil, outlining the upper portion which is usually concealed in the supra-tonsillar fossae.

inserted; and, after depressing the tongue, the parts are inspected and all mucous is wiped from the pharynx (Fig. 1).

4. The left tonsil is then firmly grasped by a vulsellum forcep (Fig. 9-a), and sufficient traction is made upon the tonsil to

cause its concealed outlines fully to be revealed behind the pillars (Fig. 2). This is very important, as it at once shows the large portion of the tonsil occupying the supra-tonsillar fossæ.

5. While keeping traction on the tonsil with the vulsellum, a small incision is made one millimeter above the semi-lunar margin

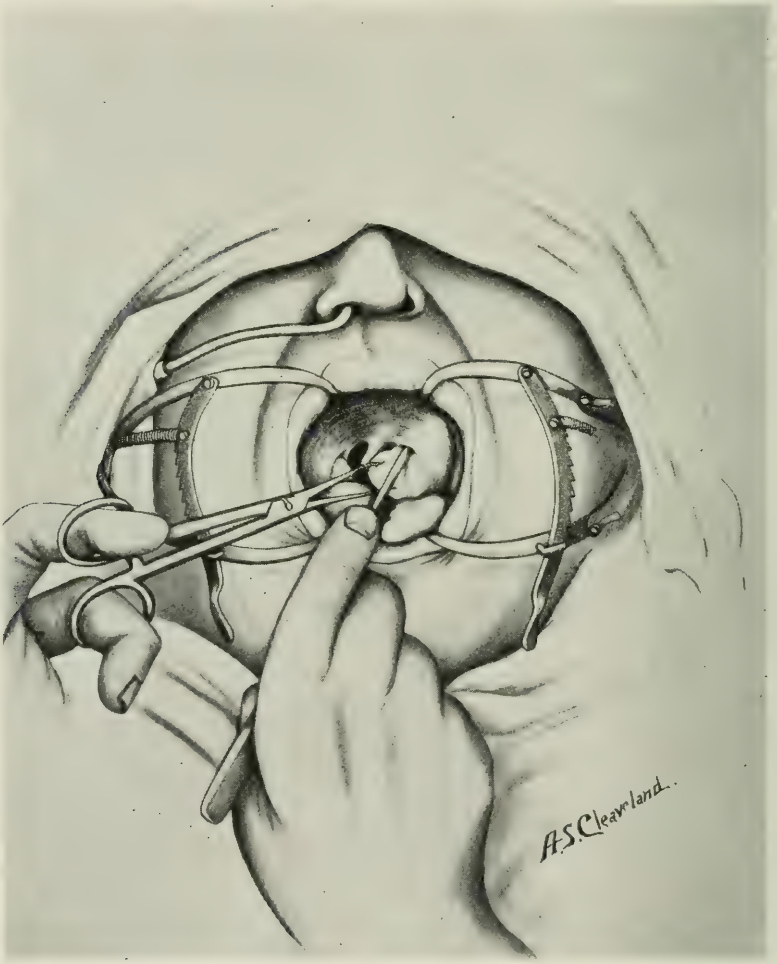


Fig. 3. Knife blade entering one millimeter above the semi-lunar margin of the plica supra-tonsillaris, and keeping between the plica and the tonsil capsule.

of the plica triangularis or plica supra-tonsillaris. This is done with the small bladed knife shown in Fig. 9-b. The knife blade should pass well up between the capsule covering the anterior portion of the velar, or supra-tonsillar lobe, and the plica supra-

tonsillaris (Fig. 3). It is very important that this incision be not too deeply placed for fear of getting inside the capsule of the tonsil. The secret of the success of any tonsil enucleation lies in keeping just outside the capsule of the tonsil and in keeping

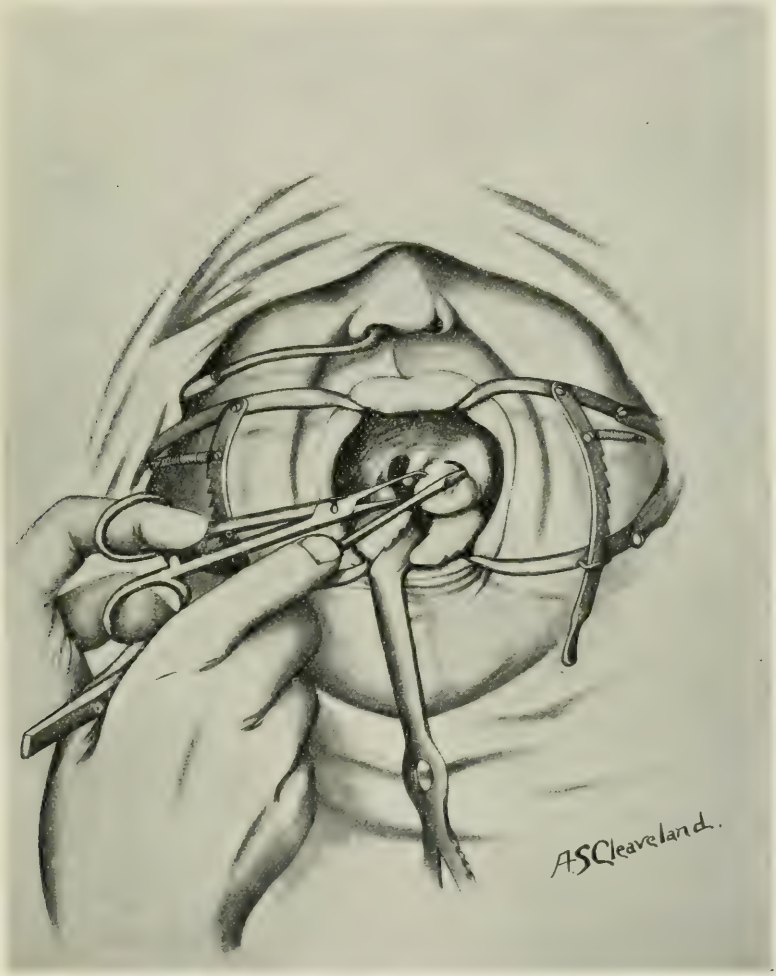


Fig. 4. Freeing the anterior pillar with blunt pointed Tyding's knife.

inside the tonsil fossæ. Fetterolf, in a recent article, deals with this point in a very thorough manner. (American Journal of the Medical Sciences. July, 1912. No. 1. Vol. CXIIV, page 37).

6. A blunt pointed Tyding's knife (Fig. 9-c) is then used to free the tonsil margin from the mucous membrane layer of the

plica triangularis, first along the anterior pillar (Fig. 4), and then along the posterior pillar (Fig. 5).

7. The tongue depressor should now be removed; tension should still be exerted on the tonsil, which is grasped by the vulsellum; the index finger of whichever hand is more convenient

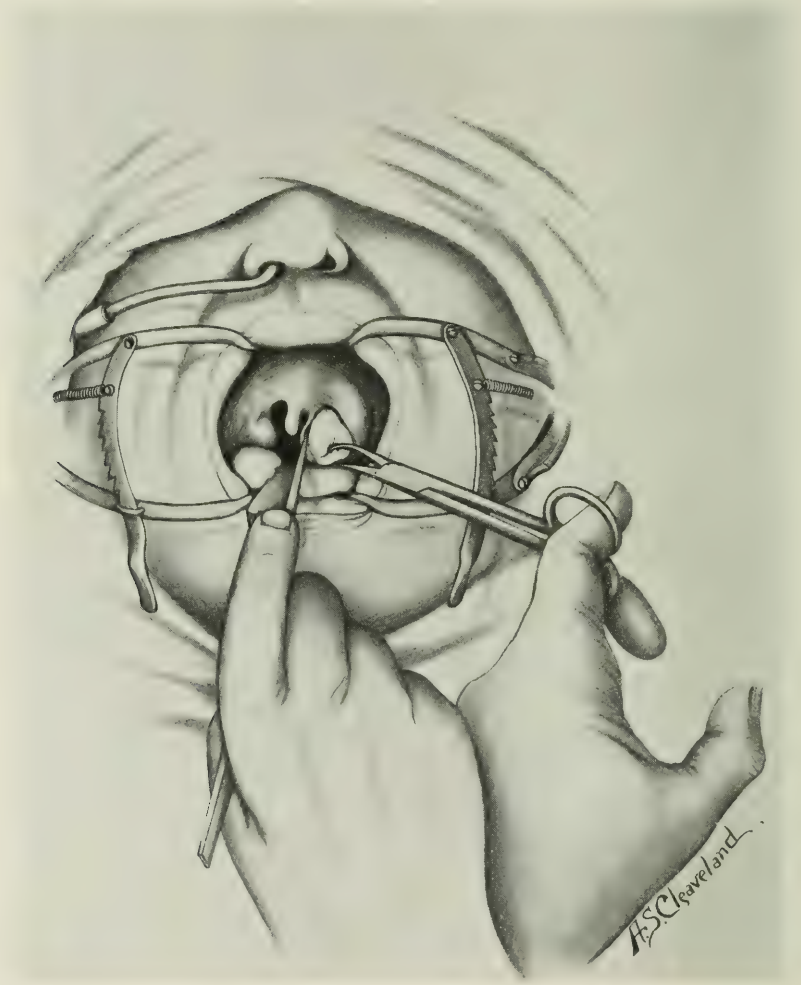


Fig. 5. Freeing the posterior pillar with blunt pointed Tyding's knife.

is passed over the top of the tonsil between the capsule and the supra-tonsillar fossæ (Fig. 6). If the finger meets with resistance, reintroduce the Tyding's knife and sever any bands which may prevent the finger entering the supra-tonsillar fossæ. Then gent-

ly sweep the finger down between the anterior pillar and the capsule, and between the posterior pillar and the capsule; pay particular attention, by digital dissection, to the freeing of the tonsil at its inferior portion near the tongue.

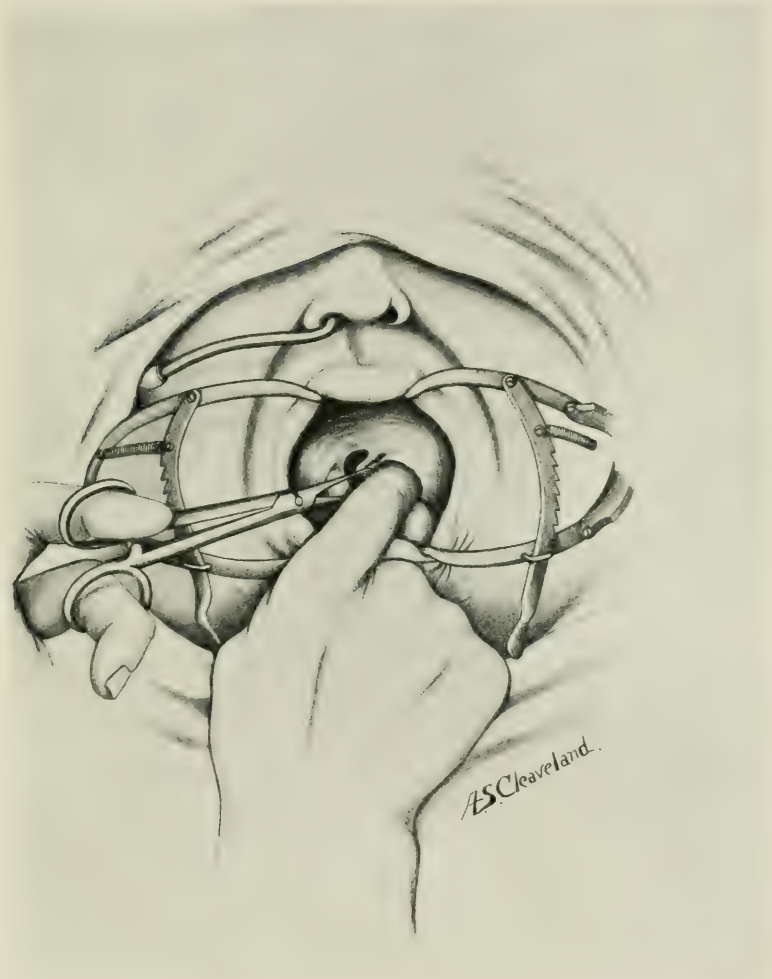


Fig. 6. With the index finger determine whether or not the tonsil is free in the supra-tonsillar fossae and separated from the anterior and posterior pillars.

8. Having satisfied oneself by means of the finger that the dissection is finished and the tonsil free from any attachments in the supra-tonsillar fossæ or to either pillar, slip the loop of

the Tyding's snare over the handle of the vulsellum which is still making traction on the tonsil, and carefully work the loop behind the tonsil (Fig. 7).

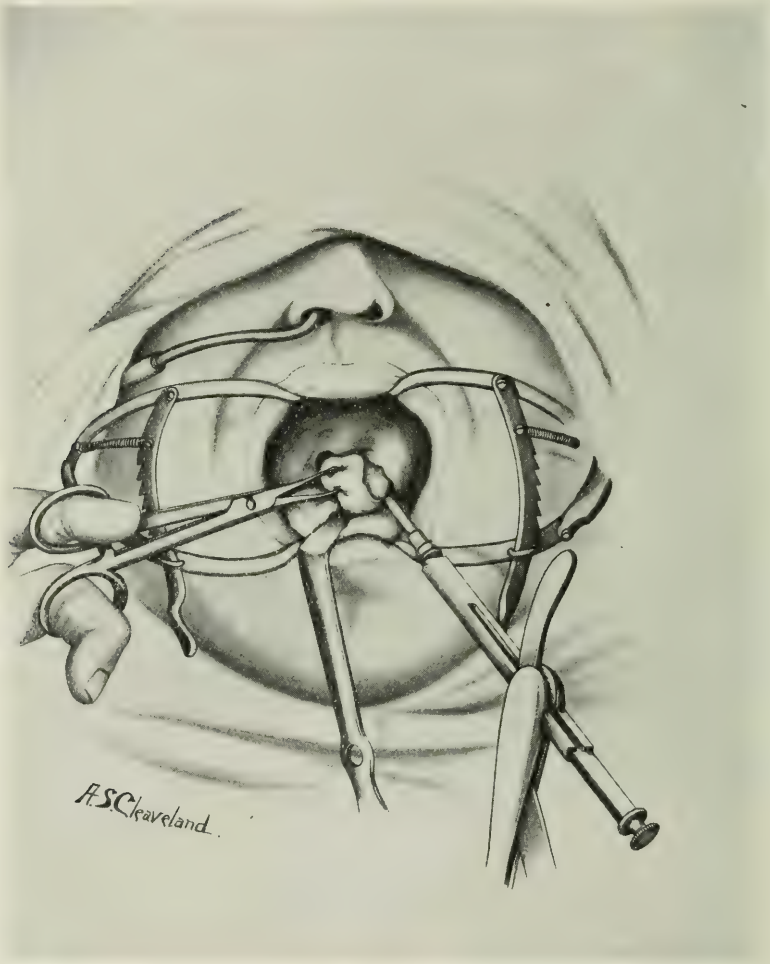


Fig. 7. Slipping the loop of a Tyding's snare over the dissected tonsil.

9. The field of operation should now be carefully sponged before tightening the wire, in order to satisfy oneself by inspection that the uvula and the pillars are not included in the loop. The loop is slowly tightened, and, when the tissues at the back of the tonsil capsule are cut by the wire, the tonsil is removed by the vulsellum.

10. Instantly the assistant introduces into the tonsil fossæ a gauze sponge on a sponge holder, making pressure till the bleeding stops. Should occasion require, these sponge holders

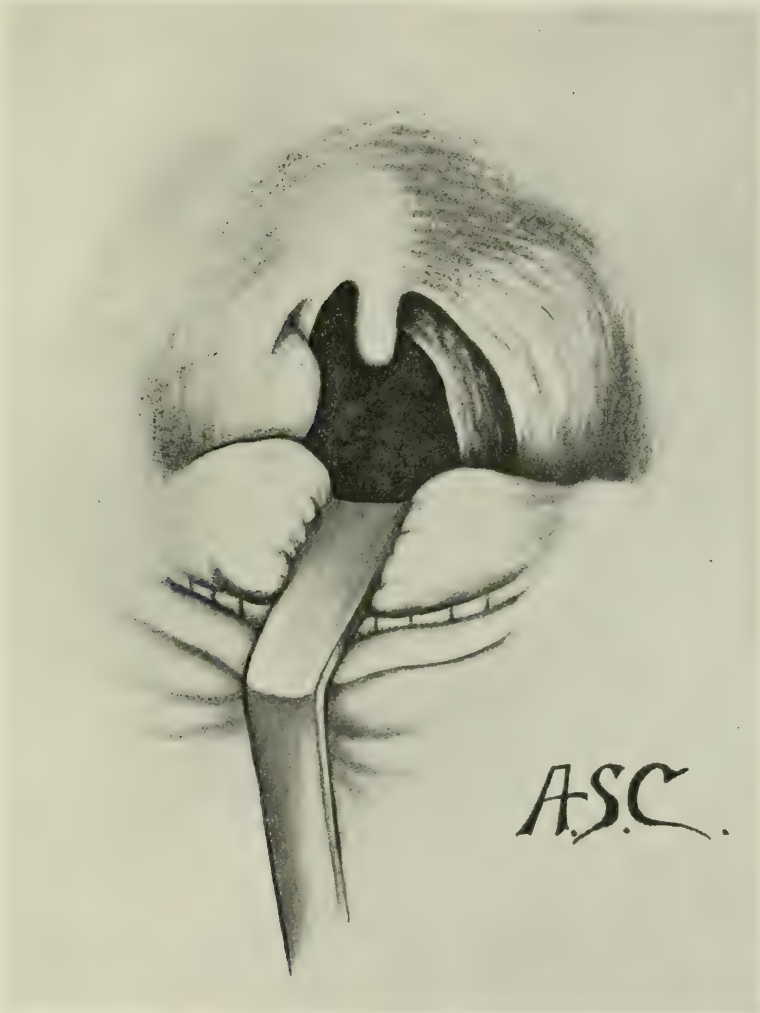


Fig. 8. The appearance of the pillars after removal of the left tonsil.

can also be used as artery clamps to control any persistent bleeding (Fig. 9-d). I have never found it necessary to tie a vessel.

11. After checking the bleeding, the right tonsil is removed in the manner just described for the removal of the left tonsil.

The appearance of the pillars after the enucleation of the left tonsil is well shown in Fig. 8.

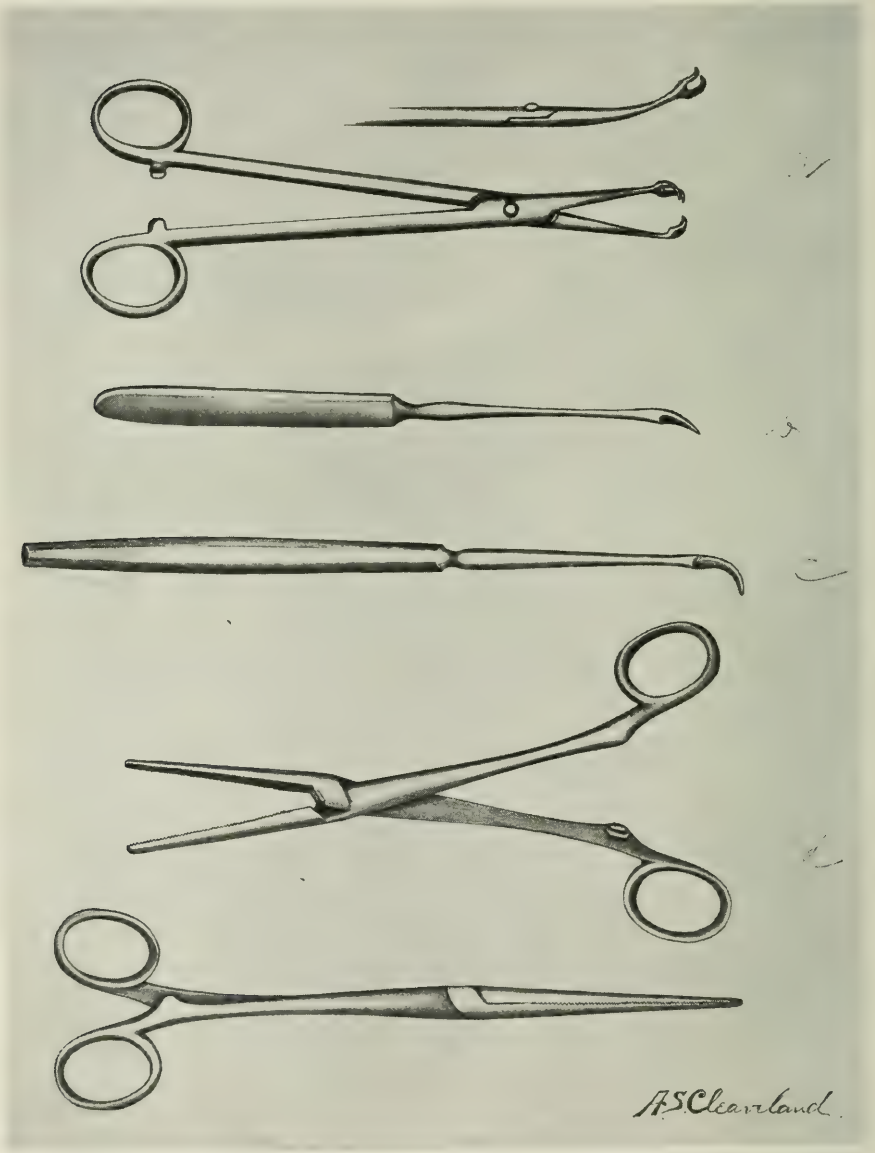


Fig. 9. a. Vulsellum forceps. b. Knife for primary incision. c Tyding's blunt pointed knife. d. Combined sponge forceps and artery clamp.

CASE OF MULTIPLE ANEURISM AT BASE OF BRAIN.

By W. H. ROBERTS, M. D., Pasadena, Cal.

This patient, in June, 1909, after two weeks of pain in the back of the head and over the right eye, developed a cycloplegia externi and interni with complete ptosis, showing paralysis of the third and fourth nerves and irritability of the ophthalmic division of the fifth; no involvement of the sixth.

In the course of a year she had recovered from her ptosis and had regained the use of the external muscles to a large extent, although a troublesome diplopia still persisted. The paralysis of the ciliary muscle continued.

The first of February, 1913, she again had pain in the back of the head and eye for a period of two weeks, followed by a complete return of her ophthalmoplegia externi. Twenty-four hours after the development of this paralysis she died very suddenly while engaged in conversation.

The autopsy was performed the following day. On removing the brain an enormous hemorrhage at the base was found, the blood extending well down the spinal canal and up both Sylvian fissures. After gently washing the blood away, a ruptured aneurism of the right internal carotid artery was found just posterior to the anterior and middle cerebral arteries. The posterior part of the aneurismal sac was adherent to the overlying middle lobe. The attachment between the middle lobe and the sac was due to an old inflammatory process, undoubtedly the site of the former hemorrhage.

Another aneurism was found on the basilar artery, just at the point of bifurcation into the posterior cerebrals. This sac was very thin.

All of the arteries at the base of the brain showed numerous atheromatous patches.

PHARYNGITIS HERPETICA ASCENDENS IN CHILDREN.

By HENRY L. WAGNER, M. D., San Francisco, Cal.

Pharyngitis herpetica is not a common affection of the throat among children though it is of more frequent occurrence than might be inferred from the statistics of laryngologists. As it sets in very suddenly and runs a rapid, though benign, course it is far more likely, especially in it's initial stage, to come under the observation of the general practitioner, in his capacity of house physician, than of the laryngologist.

My attention was first called to this disturbance some years ago by a case which occurred in my own family. Since then, through the courtesy of colleagues I have had the opportunities of observing a few other cases. The sufferers were all girls. The disease begins in the lower pharynx, quickly travels upwards to the middle and upper pharynx, and lastly to the mouth, tongue and lips. At the time of it's beginning in the lower pharynx it is very difficult to diagnose. It's beginning is marked by a sudden onset of fever (102°-104° Fahr.) and great restlessness on the part of the child who complains of pain in the throat and difficulty in swallowing. Examination of the throat shows well localized red spots of various sizes which last only for a few hours (*erythematous stage*). This is followed by the second (*phlyctenular stage*), marked by small vesicles appearing within the erythematous area. This may be interpreted as arising from the formation of exudate (fibrinous coagulation) beneath the mucous membranes. The last stage which makes its appearance from thirty to thirty-six hours after the primary onset is marked by *ulceration*: the epithelium of the vesicles is cast off and plaques are formed. From now on the process of healing takes place, though somewhat slowly.

Bacteriological analysis of the vesicular contents shows staphylo and streptococci; the saliva is highly acidulated; there is no marked swelling of the neighboring lymph-glandular structures. Examination of the urine indicates the presence of acetone and an increased amount of phosphates, urates and chlorides. The expired air has a marked acetone odor, indicating an acute gastro-intestinal disturbance which has been asserted by some authors to

be one of the exciting causes for herpes. We may therefore consider this ascending form of herpes, within the pharynx, not as idiopathic but as symptomatic illness.

The treatment consists in alkali gargles and the use of throat sprays, in the application of a weak chromic acid solution (alcohol 75 per cent) to the affected parts and in the administration internally of intestinal antiseptics.

THE NASAL SEPTUM AND ITS RELATIONSHIP TO THE SYNDROME OF SPHENOPALATINE GANGLION NEUROSIS.

By JOHN JOHNSON KYLE, M. D., Los Angeles, Cal.

In the consideration of my subject I do not propose to take up the discussion of the different forms of deflection of the septum or the operative technique of the same other than to refer briefly to the care of the mucosa at the line of incision and to emphasize a practical method of securing local anesthesia. In the discussion of local anesthesia and nasal neurosis it is necessary to review briefly the anatomy of the nerves which are found in the nasal cavity and to discuss some of the sequelæ which follow any unnatural irritation of the same.

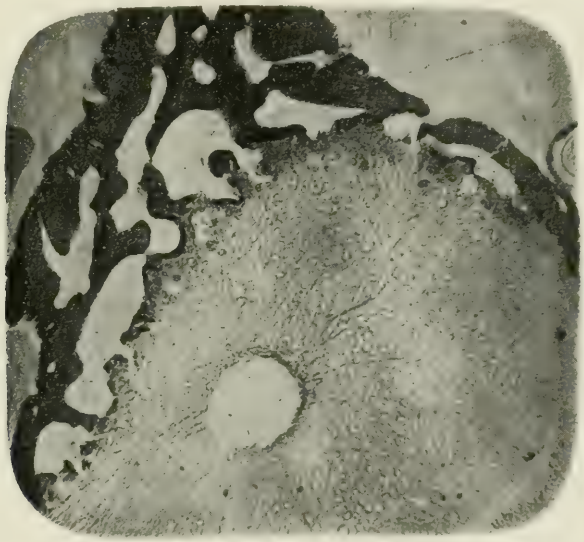
Some American writers (Charles W. Richardson, American Journal of Medical Science, 1909), make the assertion that a deflected septum is not a pathological condition, only becoming such when it interferes with the air currents through one or both sides. A comparison of the normally thin vertical septum with a thickened and somewhat bowed septum in which the currents of air do pass freely, suggests that any departure from the normal renders the septum a pathological one. Thickness of the septum is due to localized perichondritis or chondritis, and if in bone, an osteitis, due to some local or general infection, and originating sometimes from a sinus disease.

Not infrequently in the submucous operation, sections of cartilage and bone are removed varying in thickness from two to four mm., while in old patients with history of syphilis the bony septum is found to be thickened and sclerosed, the bone being so hard that it is impossible to bite through with a Ballenger forceps.

An X-ray photograph will give the operator a good idea of the size of the thickness of the septum and its upward extension. In removing the deflection it is unnecessary to go higher than the deflection. Felix Miodowski (Breslau) Zeitschr. f. Laryngologie, Rhin., etc., December, 1912, calls attention to the danger of elevating the mucous membrane to the region of the expansion of the olfactory nerve, for fear of infection spreading to the meninges by way of the cribriform plot and olfactory bundles.

Sometimes the cartilaginous septum at its posterior part has been replaced by bone. Under such conditions the cartilaginous septum is one-fourth to one-half its normal thickness. The question of the age at which the operation can be performed with safety deserves some consideration.

The nasal cavity with all its accessory cavities is completely formed at about the twenty-fifth year, and were it not that frequently the septum begins its malformation long before this age is reached, and that its growth under such conditions possibly affects the adjacent structures, operative procedure before the twenty-fifth year would be contraindicated.



Section of the thickened nasal septum showing unusual capping of the cartilage by vertical plate of the ethmoid. Magnified twenty times.

A deflected septum in early life, if pronounced enough to attract attention, should be operated regardless of age. As far as my experience goes, old age is no contraindication for the operation.

The value of suggestive therapeutics should not be overlooked in those cases in which an unstable nervous system is present, due to prolonged intranasal irritation. I do not think we can lay too much stress upon the necessity of suggestive treatment and the indication of dogmatic assertions relative to the relief that should follow the operation.

The nasal nerve is the first sensory nerve we have to consider in operation upon the septum. It enters the nasal cavity through a

slit on either side of the crista galli, after which it subdivides into three branches: an internal, or septal; an external; and an anterior. The septal branch is quite large and can be easily separated from the adjacent tissues. It closely follows the line of junction of the cartilage with the bridge of the nose beneath the mucous membrane. Sensation is supplied by the nasal nerve to the anterior half of the nasal cavity and floor of the nose. If we keep this in mind and inject two or three drops of a one per cent. solution of cocaine, to which has been added a drop or two of adrenalin, high up and along the course of the nerve, complete anesthesia of the mucocutaneous junction, the line of usual incision, is secured. It is not only unnecessary, but dangerous, to apply crystals of cocaine to the mucosa of the septum.

The external branch supplies sensation to the anterior tip of the middle and lower turbinal and the lateral wall of the piriform opening. Anesthesia of this side of the nose can also be secured by the injection of a few drops of a one per cent. solution of cocaine. The superior and posterior parts of the septum are supplied by the superior nasal and septal branches of Meckel's ganglion, which pass to the nose through the spheno-palatine foramen.

The nasopalatine, or nerve of Cotunnius, reaches the anterior floor of the nose via a small groove in the vomer and communicates with the anterior dental nerve. To anesthetize the septal branch, a syringe to which has been attached a small barrel about one and one-half inches long, is necessary so that the needle can be inserted beneath the mucosa high up into the attic of the nose posterior to the anterior tip of the middle turbinated body. Previous to the injection the parts in the region of the nasopalatine nerve may be partially anesthetized with a topical application of ten per cent. solution of cocaine on an applicator. The same technique must be carried out on the opposite side of the nose. If the anterior convexity is so great that the needle cannot be inserted into the mucosa in the region of the septal branches, a twenty per cent. solution of cocaine may be applied. This will give sufficient anesthesia to enable the operator to separate and remove the cartilaginous crest, when a few drops of a one per cent. solution of cocaine may be used with the syringe, and the operation continued. Complete anesthesia with little absorption or paralyzing effect of the drug upon the epithelium is what we want in all operations in the nose.

The anterior tip of the middle turbinate and superior turbinated bodies and ethmoid cells are supplied by the superior nasal nerve. The orbital branches from Meckel's ganglion pass from the orbit

through the posterior internal canal and supply sensation to the sphenoethmoidal recess and sphenoid cells. This nerve, as well as the nasal nerve, may be anesthetized in the orbit and at its entrance through the anterior and posterior internal orbital canals.

Dr. Jules Broeckhaert, in a discussion of regional anesthesia (Journal of Rhinology and Otology, October, 1912), says, in referring to the orbital branch, that the needle is applied perpendicularly at the superinternal angle of the orbit, at the extremity of an imaginary line representing the depression which unites the root of the nose with the frontal region. After piercing the skin, the sensation is of being in a free space. We now seek to penetrate between the bone and the periosteum, the needle being made to scrape the surface of the bone. In this layer it is inserted to a depth of between 2½ and 3 cm. As it advances (the liquid being injected as it goes along), the point of the needle is inclined successively up and down so as to insure its contact with the nerve trunk, which is stretched out horizontally between the periosteum and the anterior orbital foramen. With experience one learns to recognize the sensation of the needle in contact with the nerve.

Following the removal of the bony and cartilaginous septum the wound at the mucocutaneous junction should be closed with small plain catgut sutures, thus preventing scabbing and assuring quick repair. So many specialists overlook this important step in the technique of the operation.

Among the sequelae of deflection is atrophy of the bone and of the mucous membrane of adjacent tissues. A deflection of the turbinated bodies may also occur. Structural change in the bone and mucous membrane is probably due to irritation of the vasomotor system, not alone from pressure, but from lack of normal aeration of the nose. If the nose is partially or totally occluded, as soon as the deflection is removed, an immediate change in the color of the mucous membrane is seen, and with restoration of the normal calibre of the nose a swelling of the turbinal mucosa is noted. With the swelling, the glands and mucous membrane begin to functionate.

The majority of cases of neurosis of the nasal nerve and sphenopalatine ganglion are of the non-suppurative type and thus more difficult to diagnose. Probably the same atrophic or non-functionating condition extends to the air cells of the diseased side, causing a negative or positive pressure, a condition described by Dr. Greenfield Sluder. Swelling and anemia of the mucosa differ very little in their effect upon an already unstable nervous system.

The vasomotor and trophic systems are profoundly influenced by nasal pressure and occlusion from a deflected septum. Some of the sypmtoms of irritation of the sympathetic system are constriction, mental apathy, a feeling of fullness in the attic of the nose, sometimes nausea and skin manifestations (erythematous in character), characteristic of a pronounced vasomotor disturbance. Additional symptoms of pressure are asthenopia, migraine, an occasional feeling of constriction, and pain in the eye-ball, temple and forehead. The amount of pain varies in individuals, depending upon the exact point of pressure and the degree of negative and positive pressure within the sinuses. In a patient with a predisposition to an unstable nervous system, an inability to fill the lungs upon inspiration, a peculiar sensation of fullness in the head, and shooting pains through the forehead at times, may predispose to morbid fear and introspection. We cannot look upon the enumerated nasal symptoms as a so-called neurosis, for in a great majority of cases the pain in the area supplied by the trifacial nerve has a distinct local origin and the neurosis is only an expression of the local irritation.

Deflection of the septum is usually due to trauma, though irregular development of the nose, septum, and roof of the mouth may account for some of the deformities observed. Unequal atmospheric pressure in the nose may predispose to a deflection of a septum that is naturally thin and fragile. A deflection of the septum from any cause, especially if due to faulty atmospheric pressure, has a tendency to grow and it is sometimes only late in life that symptoms of pressure are complained of. An old fracture of the septum can be differentiated, the writer thinks, from a bowing of the septum from pressure or unequal development. In fracture the cartilaginous parts are never firmly united. If low down, the nasal spine of the upper jaw is imperfectly united to the cartilage, and not infrequently there is an over-riding of the cartilage and bone. In some cases hypertrophy of the cartilage and bone may be found and in other cases a sclerosis of the bony septum and cartilage. This condition is frequently found in patients who have had syphilis in early life. A localized perichondritis from any cause may predispose to a deflection. The writer has never been able to decide positively whether a hypertrophy of the lower turbinated body of one side, which is so often present, predisposes to a deflection of the septum, or the deflected septum caused the hypertrophy of the turbinated body.

The disagreeable symptoms of hypertrophy vary somewhat according to the portion of the septum involved. Anterior deflection or deflection which presses upon the region of the anterior tip of the lower turbinated body or lateral wall of the piriform opening of the nose, does not give rise to the local and general symptoms which are observed when the septum presses upon the middle turbinated body. Anterior pressure may so occlude the nasal passage as to cause deflection of the nose, difficulty in filling the lungs, catarrhal deafness and nasal tones. The so-called reflex symptoms are usually absent. Symptoms of pressure in the region of the nasopalatine nerve and branches of Meckels ganglion which supply the anterior portion of the middle turbinated body, produce the syndrome of sphenopalatine neurosis. In addition to pressure and irritation of the sensory and sympathetic fibers, we have pressure upon the olfactory nerve filaments. With irritation of the complicated nervous mechanism of the attic of the nose, the impressions are easily carried by way of the trifacial nerve to the nuclei of the facial and vagus nerves in the medulla. The result of irritation of the motor, sensory, and sympathetic nerve fibers is far reaching and nutritive cardio-vascular changes are to be expected.

Sendziak and others have already called attention to the influence of hypertrophy of the lower turbinated bodies upon the thyroid gland, and Dr. Williams has remarked upon the fall of blood pressure while elevating the mucoperichondrium in the submucous resection of the septum. If all this be true, the nose is entitled to more consideration in the role of a cause of many obscure neuroses.

In a given case of sphenopalatine ganglion neurosis in which there is any departure from the normal high up in the septum, the septum should be operated upon first, and the middle turbinated body or sinuses later, if the symptoms persist. When indicated, there is no operation within the nasal cavity that gives happier results than a submucous resection of the nasa septum.

THE MÉNIÈRE SYMPTOM-COMPLEX. A CLINICAL REVIEW.

By HILL HASTINGS, M. D., Los Angeles, Cal.

I wish to present to you some case-records of labyrinthine affections in which the Ménière Symptom-Complex occurred, to discuss those of special interest and to invite your discussion of the subject. I regret that I cannot hope to bring before you any new facts, nor do I presume to attempt a classification of non-suppurative labyrinthine affections.

The subject of non-suppurative affections of the labyrinth has lagged somewhat in comparison with that of labyrinthitis, secondary to middle-ear suppuration. There are two reasons why this should be true. Firstly, suppuration of the labyrinth has offered a field wherein the clinical findings can often be verified by operation. Secondly, labyrinthine suppuration is not infrequently the cause of death. Autopsies are, therefore, frequently obtained. On the other hand, it is an exceedingly rare event to be able to verify by autopsy one's clinical observations in non-suppurative affections of the labyrinth, death having resulted from other causes, remotely related to the ear affection. For these reasons it is incumbent upon us as clinicians to review our past clinical experience, readjust our methods of examination in accordance with recent scientific investigations and thus do what we can to illuminate by clinical experience the still dark portion of the ear. One must often regret that the hidden nerve-field of the ear can not be seen by the otologist as is the fundus of the eye by the ophthalmologist.

I have recently had occasion to review 147 of my own records of non-suppurative cases in which the functional tests showed involvement of the auditory nerve apparatus. Seventy-four cases (about 50 per cent) were without definite middle-ear signs or symptoms. The remainder, 73 cases, showed signs of labyrinthine deafness, as follows,—in otosclerosis, 37 cases; in chronic catarrhal otitis media, 23 cases; in tuberculosis of the ear, 13 cases. (Tubercular cases are included because the labyrinthine destruction did

not follow the usual course found secondary to middle-ear abscess).

Of the 74 labyrinthine cases (not secondary to middle-ear disease) 20 (27 per cent) presented Ménières symptoms. In eight cases the dizzy spells were of the apoplectic form.

The term "Ménière's Disease" has been rather loosely applied. The classical case, reported by Ménière in 1861, served to direct attention to the anatomical seat of a diseased condition that caused a characteristic combination of symptoms—deafness and dizziness, with nausea or vomiting. Ménière's interpretation of his findings in this case has been questioned. The hemorrhagic exudate, which he found in the labyrinth, could not in itself explain the cause of death. The patient, a girl of 18 or 19, died in five days, and the autopsy showed no middle-ear suppuration and no suppurative intra-cranial lesion. Bezold believed that the case was one, not of hemorrhage in the labyrinth, but of epidemic cerebro-spinal meningitis, with extension to the internal ear—a sporadic case in which the meningeal condition was overlooked. While this is the most plausible explanation of Ménière's case the term "Ménière's Disease" has been generally applied to non-suppurative affections of the labyrinth, or auditory nerve apparatus, in which Ménière's symptom-complex occurs. And Ménière restricted the classification to cases in which nerve deafness and not middle-ear deafness is found.

Cases presenting Ménière's symptom-complex as a rule result from (A) diseased conditions of the blood vessels supplying the labyrinth, or (B) disease of the eighth nerve including its end organs in the labyrinth. From a therapeutic view-point cases of Ménière's disease properly belong to the general practitioner or to the neurologist.

(A) Cases of the vascular class include (1) hemorrhagic or (2) serous exudates (16) in the labyrinth; (3) embolism of the internal auditory artery or its branches (the terminal arteries are end-arteries like those of the brain (1 and 4) embolism (5) arterio-sclerosis (15) (responsible for sudden anemia and possibly for nerve atrophy (6) aneurysmal pressure on the nerve, (7) luekaemia (probably responsible for hemorrhagic exudates or nerve impoverishment) (8) severe anæmias.

(B) Cases due primarily to neuritis, include:

(1) Toxic neuritis (Salvarsan, alcohol, quinine, etc.). (2) Infectious neuritis (syphilis, mumps, influenza, typhoid, tuberculosis, cerebro-spinal meningitis, diabetes). (3) Tumors of the eighth

nerve itself and tumors pressing upon the eighth nerve (cerebello-pontine angle) (other nerves frequently affected at the same time). (4) Meningitis with adhesions (other nerves frequently affected).

CASE REPORTS.

I.

A Case of Ménière's Disease, Apoplectic Form, Occurring During Childbirth.

Mrs. W., age 38, referred from San Diego, on account of deafness in the right ear. The deafness was noticed after the birth of her last child, six months ago. Had never had any deafness or other ear trouble prior to that time. The labor was difficult,—on coming out from the anesthetic she noticed great dizziness, nausea and vomiting. She did not attach any special significance to the symptoms; had never had similar experience in previous labors (has three healthy children). The dizziness continued two or three days, then subsided. Deafness was noticed on lying on her left ear. My examination showed complete nerve deafness. Weber to the good ear; bone conduction decreased; absolute deafness to whisper, speech, C to c_4 forks and to Galton whistle.

The etiological relation to the labor, in this case, and the sudden onset, would indicate a hemorrhage or embolism of the cochlear branch of the artery. A toxic neuritis would be also a possible explanation. Lecompte (14) reports a similar case occurring in childbirth. H. Knapp (10) reports a similar case after miscarriage.

II.

A Case of Ménière's Disease—Apoplectic Form Atrophy of the Cochlear Nerve; No Permanent Injury to the Vestibular Nerve.

Miss S., age 27, referred Oct. 29, 1912, on account of deafness in right ear. Two months ago while making a purchase in a drug store suddenly noticed a queer buzzing in the ear and sudden dizziness; had to "grab the counter to keep from falling;" did not lose consciousness; had to lie down; a doctor who was called, said she had a "slight stroke." She was able to walk with help to a taxicab and went home; vomited in an hour and off and on all day. After a day or two these symptoms passed off but noticed she was deaf. She did not have any headache or

fever; the attack was not at the time of her menstrual flow, which had always been normal; her general health had been and is now excellent. Examination shows complete deafness in the right ear to acoumeter, speech, forks C (64 d. v.) to C_4 and to Galton; normal nystagmus reaction, caloric (hot and cold) and to turning.

I saw and re-examined this patient March 1, 1913, and found no changes from those above noted.

The suddenness of the attack, the complete deafness in the affected ear, without change in the vestibular reaction, and the absence of other signs or symptoms would indicate a hemorrhagic or serous exudate in the cochlea, resulting in complete atrophy of the organ of Corti; or blocking of the cochlear branch of the artery by an embolus.

III.

A Case of Ménière's Disease—Apoplectic Forms Partial Deafness; No Vestibular Changes.

C. E. S., age 36, referred October 20, 1909, by Dr. Bryant, Glendale, on account of repeated attacks of dizziness and noises in the ear. His trouble dates back one year; began while walking on the street; suddenly fell backward and to the right; did not lose consciousness; was dizzy and nauseated for only a few minutes. He had a similar attack nine months ago and another attack last night. Each attack is sudden, unheralded by any symptoms and not accompanied by loss of consciousness. He always falls to the right. His family physician could find no diseased condition. He has never had syphilis; does not drink; general health is excellent.

Examination of ear, nose and throat is negative, except for bruised right auricle due to last night's fall. The hearing in the left ear is slightly impaired; watch one inch, ordinary conversation eight feet, bone conduction reduced 20 seconds (C 128 d. m.). Air conduction c to c_4 reduced as follows:—c 40 sec., c_1—30 sec., c_2—20 sec., c_3—30 sec., c_4—15 sec. The patient says all the tones in the left ear are sharp as compared to the right. November 3, 1909, patient returns, has had another attack, similar in every way to the others. The dizziness lasted not over a minute. "had to grab the counter in the store to keep from falling,—felt as if some one had bowled me over."

April 1913, Dr. Bryant reports that the patient is still living and in excellent health; has moved up north and has had only

three attacks in the last two years. He states that the patient had a malarial history.

The cause in this case is, of course, obscure The symptoms are suggestive of nerve irritation, from pressure periodically applied The fact that the patient always fell to the right (the side of normal hearing) is contrary to my own experience in these cases. They have almost always fallen or had a tendency to fall to the diseased side.

IV.

A Case of Mild Form of Ménière's Disease,—Probably Tobacco Neuritis.

Mr. W. F. S., age 48, referred by Dr. Ross Reed, Pasadena, July the 3rd, 1912, on account of sudden deafness and fullness in right ear, and dizziness. Trouble dates back one month; thought it was probably due to sudden blast from an automobile horn; has never had previous ear trouble; has not had a cold in the head; no catarrhal symptoms. General health good; denies syphilis; is married, has several children; does not drink, but has always smoked excessively, cigars and pipe; stopped smoking ten days ago.

The dizziness comes on at times; the spells are not severe enough to fall, but make him stagger; thinks the dizziness only comes when he moves his head; "the room seems to turn around."

Examination of the ear showed no middle-ear signs. Hearing in right ear considerably reduced:— acoumeter, 10 inches; whisper ("four" and "six"), 6 inches and 18 inches respectively; conversation, 12 inches (dim); bone conduction reduced 15 seconds; Gelle positive; air conduction, Forks C to c, greatly reduced; c_2 and c_3 barely heard at all; c_4, poor; Galton whistle, questionable (hears with left ear); vestibular reaction to cold water and to turning is normal both sides. Examination of the eyes (Dr. L. W. Mansur) was negative. After five months treatment, this patient improved somewhat. His last record (Dec. 27, 1912,) shows marked improvement in the hearing for forks and moderate improvement to conversation,—whisper 6 feet; conversation 7 feet, forks c, poor (barely heard); C, 25 sec.; c_2, 20 sec.; c_3, normal; c_4 normal. He had stopped smoking and had lived an easy life. He took about 4 ounces of Potassium Iodid, in five-grain doses three times a day. I never could see the slightest improvement after catheterization of the tubes; in fact, inflation seemed to make him temporarily more deaf.

V.

A Case of Nerve Deafness (Both Ears), Following an Attack of "Grippe." Dizziness and Vomiting.

Mrs. W., age 81 years, referred Oct. 23, 1912, on account of deafness. Two years ago patient had a severe attack of "Grippe;" confined to her bed for five months; no meningeal symptoms; towards the end of the illness had severe vomiting spells with dizziness, attributed to the stomach; remembers that there were some noises in the ear; did not have earache nor ear discharge; became profoundly deaf. When she was able to get out of bed, noticed she could not walk in a straight line Examination showed both drum membranes normal. Hearing to acoumeter, whisper and speech is gone; bone conduction (c 128 d. v.) reduced; forks C to c_4, negative in the right ear; in the left ear could hear c_3 fork alone (30 seconds); Galton not heard in either ear; vestibular reaction not tested.

J. M. Downey (17) reports a case of labyrinthine deafness, due to "Grippe," in which in addition to the cochlear nerve atrophy, there was loss of vestibular reaction.

VI.

Apoplectic Form of Ménière's Disease. Complete Deafness.

Mrs. A. S., age 33, referred April 21, 1910, by Dr. Pallette. Deafness in right ear dates back 15 years. There was no earache and no discharge: remembers considerable dizziness and noises in the ear and that the hearing was suddenly lost and has never changed. For about 10 years has had attacks of sudden dizziness, nausea and vomiting, coming on suddenly; so severe has fallen several times; last attack 1½ years ago; the attack would not last long, and there was never any unconsciousness; attributed to the stomach.

Examination: Middle-ears normal. Left, hearing normal; absolute deafness in the right ear to speech and all forks (C to c_4); Galton questionable. (Hears with good ear.)

In this case the persistence of the attacks of dizziness, severe and sudden, over such a long period of time is noteworthy.

VII.

A Case of Sudden Deafness, Dizziness and Vomiting.

C. F., age 62, referred by Dr. Bancroft, on account of deafness (left ear) of four days' duration. The deafness came on suddenly and without apparent cause. Noticed a "feeling of fullness in

the ear and got very dizzy, had to lie down, did not fall, was nauseated and vomited." Did not have a cold; was not sick. Deafness in the right ear for years.

Examination: Left ear, drum membrane thin, translucent, good mobility; no signs of middle-ear inflammation. Hearing,—acoumeter, 1 inch; whisper, 12 inches; speech, 2 feet; Rinne, positive; bone conduction reduced 25 seconds (C 128 fork); air conduction c reduced 15 seconds; c_1 fair; c_2 fair; c_3 fair; c_4 almost normal; Galton heard up to 25; vestibular reaction normal in both ears.

The age in this case would indicate a vascular change in the labyrinth, due likely to arterio-sclerosis, and producing sudden anemia.

VIII.

Sudden and Complete Nerve Deafness—Partial Restoration—Anemia (?).

Mr. H. S., age 57, referred April 30, 1910, from San Diego, by Dr. Fry. Complaint:—buzzing in both ears and deafness. Onset, four days ago, attributed to exposure to strong east wind and to removal of a heavy beard; thinks he caught cold, but has no signs of a recent cold in the nose and no middle-ear signs. Has always had good hearing in the right ear, but some deafness in the left ear for years. His hearing tests show complete absence of hearing in right ear to acoumeter, speech, and to forks C to c_4, and to Galton. In the left ear hearing greatly reduced—acoumeter ½ inch, whisper five inches, speech three feet, forks, C-20 seconds; c_1 good; c_2 good; c_3 good; c_4 not heard; Galton not heard. Vestibular reaction, through turning, equal on each side, 20 seconds duration.

May the 4th (four days after my first examination) I was surprised to find that there was a return of hearing in the right ear,—acoumeter, negative; speech, six inches; C fork heard well; c_1, c_2 and c_3 fairly well heard, reduced about 20 seconds; c_4 not heard at all. The patient left for England. I referred him to an otologist in London. I never heard from this case. The complete deafness, sudden onset, and partial restoration of hearing, together with the age of the patient and hard radial arteries, indicated vascular disturbances in the labyrinthine vessels, possibly local anemia of the cochlea.

Richard Lake (15) reports several interesting cases of vertigo and deafness due to arterio-sclerosis.

IX.

A Case of Nerve Deafness; Apoplectic Form of Ménière's Disease; Ocular Paralysis.

E. M. P., age 55, a clinic patient, came to me first in November, 1904, right ear deafness noticed three years before, came on suddenly, ear felt stuffed up and hissing noise in ear, no pain, no discharge; was working at his trade (blacksmith), but deafness was not apparently caused by any sudden noise or blow on the ear, no headaches—has been completely deaf in right ear since. Dizziness began six months ago, off and on, mild at first, but upon one occasion fell down unconscious for a few seconds; got up and was ashamed for fear of being thought to be drunk (patient never drinks, not a glass of beer in two months on an average). In a week or two had another attack preceded by a trembling; since then has had three or four attacks but never quite lost consciousness. Last attack yesterday, preceded by increase in dizziness, but no other prodromic symptoms. Double vision, first noticed blurring and over-lapping of images about 17 years ago, gradually got worse and for past five years has been severe, has to use a ground glass on left eye to enable him to walk (consulted Dr. Pardee, San Francisco, who told him the nerve in the left eye was affected).

Previous history: No illness since childhood; denies syphilis; general health is good; is married, has seven children.

Examination: Middle-ear condition is practically normal both sides. Hearing, complete deafness in right ear for all sounds.

In this case we have a record of ocular paralysis of 17 years duration, while the eighth nerve became affected only three years ago.

It has been my privilege recently to see at autopsy, a brain from a case likely of this kind. The patient, a woman, age 50, had suffered for years with disturbances of the third, fifth and sixth nerves. The vessels at the base of the brain showed multiple aneurysmal dilatations, and marked athermatous changes. Death had resulted from rupture of one of the aneurisyms. The brain itself was normal. This patient had suffered from ocular paralysis for years. Diagnosis made only at autopsy.

X.

A Case of Deafness and Dizziness, Due to "Nervous Prostration,"—Deafness Almost Complete.

Mrs. B., age 52, came to my office October, 1912. Almost two years ago had a vomiting spell—deafness dates from that time. After this spell had "nervous prostration"—had been very nervous ever since—the last two months before coming to me patient had been getting better. After this spell there were many noises in the right ear,—"severe noises." Following this attack was sick in bed six weeks, was dizzy and had a tendency to fall to the right. Had some slight confusion in memory. Had no difficulty in swallowing.

Examination: Right ear drum dull and slightly retracted, but not sufficient to account for degree of deafness. Left ear—good glistening, large calcereous deposit below, but otherwise normal. Throat in good condition. Tube opened freely and drum membrane vibrated freely, if anything a little stiff. Hearing,—Right, absolutely destroyed; left, normal. It is noteworthy in these cases of unilateral nerve involvement, with vestibular irritation, that the tendency is to fall *toward* the affected side.

XI.

A Case of Ménière's Disease; Apoplectic Form, Cochlear Nerve Atrophy.

Mrs. H., age 50, referred March 21, 1913, by Dr. A. L. Macleish, on account of deafness, left ear. Ear trouble dates back five weeks—began with dizziness, nausea and vomiting; attributed to the stomach; was so dizzy she had to go to bed,—whenever she raised up would fall forward and to the left. Dizziness and nausea lasted three days. No earache; no discharge; no fever. One year ago, after "grippe," had some stuffiness in the same ear, relieved by two or three inflations. Is positive her hearing was acute up to this sudden attack five weeks ago. Patient has been out of bed the past two weeks; is weak and uncertain in her gait, but the dizziness has gone. Examination of the eyes (by Dr. A. L. Macleish) shows glaucoma but no ocular paralysis. Blood examination (by Dr. Walter Brem) is negative; Wassermann reaction is negative. Aural examination,—left drum membrane practically normal; completely deaf to acoumeter, whisper, conversation, and to all forks, C to c_4 and to Galton.

Caloric reaction (left) quickly developed (cold water, 66 degrees, ½ quart in left ear as against 1 quart in right ear); reaction nystagmus well marked, lasted thirty seconds and accompanied by considerable nausea.

It was impossible to explain the etiology in this case. Syphilis and leukaemia were excluded. The patient left for her home in the East, referred to her former consultant, Dr. Charles H. Beard, of Chicago.

Spaulding (16) has recently reported a similar case from supposed labyrinthine effusion, similar to iritis serosa or episcleritis.

XII.

A Case of Nerve Deafness Associated with "Nervous Prostration." Dizziness.

Mr. M. E. J., age 52, referred January 20, 1913, by Dr. Robert Lewis, Jr., New York. Has come to California for his health. No organic disease has been found, but has had a general nervous breakdown from long period of work as railroad man. Denies syphilis. Wasserman reaction (taken at request of Dr. Lewis) was negative. Deafness has been marked of late; rapidly grown worse in the right ear; almost complete deafness in the left ear. Has frequent dizzy spells, attributed to constipation; thinks he always tends to fall backward during the spells, "room seems to be turning around." Never any headache.

Examination: Left membrane somewhat retracted, otherwise, normal; right membrane slightly retracted. Hearing (right ear): —acoumeter, 1 inch; whisper, 3 feet; speech, 2 feet (dim); Rinne, positive, forks C to c_4 reduced 25 to 40 seconds; Galton heard up to 45. Hearing left ear, absolute deafness to whisper; conversation and all forks (C to c_4), except c_3 which is faintly heard; Galton heard up to 40. Vestibular reaction is normal and equal both sides.

XIII.

A Case of Atrophy of Both Cochlear Nerves; History of Hemorrhages and Dizziness.

Mrs. F. R., age 52, referred from Pomona, December 19, 1910, on account of deafness both ears. Right ear had been deaf for five years. Left ear suddenly became deaf one month ago. At present unable to hear conversation in either ear. Right side

deafness began five years ago with a severe attack of dizziness and general exhaustion. Was confined to her bed for six weeks. Vomited blood and had hemorrhages from the bowels off and on for two or three months,—considerable prostration. (Unable to secure any opinion as to the nature of the disease). From this attack right ear was rendered absolutely deaf, but could hear well with left ear until one month ago. Has had no earache or ear discharge and nothing to account for the sudden deafness. Dizziness during the first attack was so severe had to sit down to keep from falling.

Examination: Right drum membrane dull, slight retraction, otherwise negative. Left, the same. Hearing entirely gone in right ear, to watch, acoumeter, whisper, speech, and all forks; bone conduction (c-128) reduced to 20 seconds. Hearing left ear also entirely destroyed, except for the c-(128) fork which is heard about 20 seconds. Galton not heard in either ear. Pupils react normally to light and accommodation. No paralysis of the fourth, fifth, sixth or seventh nerve. Ears had been inflated for a month without any improvement in the hearing. Tube was open and dry and no middle-ear signs to account for the deafness. Patient was married and had several children; was not questioned as to specific history.

The peculiar attack in which there was hemorrhage from the bowels and vomiting of blood for two or three months might have a bearing on the etiology of this case. Patient was treated in another part of the country. If a careful diagnosis had been made at the time of the hemorrhage the cause for the nerve atrophy might have been found.

Etiology.

As to neuritis of the auditory nerve some interesting facts are established. Neuritis probably occurs more frequently than one would think and is more easily overlooked. Wittmaack (1) states that, "the cochlear branch with its associated ganglion is imbedded in an unyielding bony capsule, partly surrounded by broad lymphatic spaces;" that "the blood vessels are end arteries; that the ganglion cells are smaller than all other ganglion cells in the vertebrates; that moreover, they are bipolar and possess medullary membranes; that these anatomical relations show the elective vulnerability of the cochlear nerve."

Paul Manasse (2) in 31 cases of eighth nerve deafness found that the cochlear branch alone was affected in 24 cases. Wittmaack states, "It is not strange that a particular group of nerve fibres should be affected. This can be observed in other nerves, i. e., the recurrent laryngeal nerve, also the optic nerve— as in tobacco amblyopia; also in neuritis from lead poisoning." So with the eighth nerve disease the cochlear branch alone is often affected.

Wittmaack states, "It is presumable that in the labyrinth, pathological processes generally occur in the form of small morbid foci, in the form of small hemorrhages, or inflammatory exudates, orinfiltrates, situated within the delicate membranous labyrinth. From many of the autopsy reports of cases diagnosed 'Ménière's' it seems to me that a serous exudate or a sudden disturbance in the lymphatic circulation may have produced the symptoms." (Case XI may be explained in this way.) "Arterio-sclerosis may produce nerve atrophy through disturbance in the nutrition of the nerve. Atrophy and neuritis cannot be differentiated clinically."

One fact stands out prominently, namely, that while optic neuritis and atrophy can be diagnosed objectively, auditory neuritis and atrophy can only be diagnosed during the life of the patient by testing the cochlear and vestibular nerves. That the clinical findings in such cases point to underlying conditions of grave concern to the patient, should stimulate us to examine our ear cases most carefully.

Reports in the last year or two of neuritis, occuring in syphilities, after Salvarsan injections, show the auditory nerve affected about twice as often as the optic nerve. As to whether the syphilitic virus or the Salvarsan is responsible for the neuritis cases, it is worth mentioning that Prof. Alexander in six years prior to the advent of Salvarsan observed 68 cases of lues of the ear; in only 12 cases symptoms appeared in the early stage (third to sixth month); whereas Prof. Finger in six months had as many cases after Salvarsan treatment. Alexander, therefore, concluded that there must be an etiological relation in the eighth nerve neuritis to Salvarsan injections.

A large number of reports are being made of neuro-recurrence after Salvarsan injections. For example: Duel (Boston meeting International Otological Congress, August, 1912) stated that he had seen three cases lately of eighth nerve neuritis after Salvarsan injections—all within the first two months—an occurrence

that he had not met with in an experience of fifteen years. He mentions that Benario collected 14,000 cases treated by Salvarsan, in which 126 cases of neuro-recurrence occurred. Of the 126 cases, 51 showed eighth nerve involvement.

The Therapy of Ménière's Disease.

The therapeutic measures advocated in cases of Ménière's disease have been many and of remarkable variety.

Parry (3 and 9) advocated the use of a seton placed in a fold of tissues of the neck at the base of the skull.

Blake and Putnam (5, 6 and 7), following Babinsky, used lumbar puncture with improvement in some cases. Dundas Grant (4), Bradley (11) and others following Charcat, advised the use of quinine in Ménière's disease. The use of pilocarpine, potassium iodide, complete body rest, depletion by sweating, and cathartics, is rational and advised by many authorities. The use of vaccines and bacterins, as reported by one observer (Sherman—8) seems irrational and his results not conclusive.

Where the labyrinth tests show complete nerve deafness of long duration, atrophy of the nerve has taken place, and treatment would, of course, be of no value in clearing up the condition; however, as the other cochlear nerve occasionally becomes affected it is wise to attempt to ward off trouble by using those therapeutic measures applicable to the particular case. In acute cases during the course of syphilis specific treatment is, of course, to be instituted. As to whether or not Salvarsan should be used is too large a question to be discussed in this paper. It seems to me that the answer to the question largely depends upon whether the threatened damage from the specific infection is great enough to warrant running the possible risk of the toxic damage from Salvarsan.

In an acute case of Ménière's disease, not specific in origin, a search should be made for the underlying cause, such as,—arteriosclerosis, or endocarditis (from which a vegetation might have been broken off into the blood stream and lodged in the labyrinthine artery); or for some of the diseased blood conditions, as pernicious anemia, leukemia, etc.; or diabetes, nephritis, etc. As the treatment depends largely on treating the underlying condition, the otologist in most cases likely would best serve the patient by referring him to a good internist or neurologist, being content with pointing out the nerve change that his examination disclosed.

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AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY.

MINUTES.

The Nineteenth Annual Meeting of the American Laryngological, Rhinological and Otological Society convened at the Shoreham Hotel, Washington, D. C., May 8th, 1913, at 9.00 A. M.

The Society was called to order by the President, Dr. H. Holbrook Curtis, of New York City.

The following members registered during the sessions:

WILLIAM J. ABBOTT, M. D.	Cleveland, O.
JOHN L. ADAMS, M. D.	New York, N. Y.
FRANK ALLPORT, M. D.	Chicago, Ill.
F. C. ARD, M. D.	Plainfield, N. J.
HUBERT ARROWSMITH, M. D.	Brooklyn, N. Y.
WILLIAM L. BALLENGER, M. D.	Chicago, Ill.
JOHN F. BARNHILL, M. D.	Indianapolis, Ind.
JOSEPH C. BECK, M. D.	Chicago, Ill.
H. S. BIRKETT, M. D.	Montreal, Canada.
HUGH B. BLACKWELL, M. D.	New York, N. Y.
W. C. BRAISLIN, M. D.	Brooklyn, N. Y.
R. BISHOP CANFIELD, M. D.	Ann Arbor, Mich.
WILLIAM B. CHAMBERLIN, M. D.	Cleveland, O.
TALBOT R. CHAMBERS, M. D.	Jersey City, N. J.
WALTER F. CHAPPELL, M. D.	New York, N. Y.
GEORGE M. COATES, M. D.	Philadelphia, Pa.
LEWIS A. COFFIN, M. D.	New York, N. Y.
BURNETT COLLINS, M. D.	Brooklyn, N. Y.
ALGERNON COOLIDGE, M. D.	Boston, Mass.
JOHN F. CULP, M. D.	Harrisburg, Pa.
H. HOLBROOK CURTIS, M. D.	New York, N. Y.
EWING W. DAY, M. D.	Pittsburg, Pa.
ARTHUR B. DUEL, M. D.	New York, N. Y.
HOBART S. DYE, M. D.	Washington, D. C.
H. BERT ELLIS, M. D.	Los Angeles, Cal.
FRANCIS P. EMERSON, M. D.	Boston, Mass.
WOLFF FREUDENTHAL, M. D.	New York, N. Y.
PERCY FRIDENBERG, M. D.	New York, N. Y.
HARRY FRIEDENWALD, M. D.	Baltimore, Md.
MAX A. GOLDSTEIN, M. D.	St. Louis, Mo.
JOSEPH B. GREENE, M. D.	Asheville, N. C.
THOMAS H. HALSTED, M. D.	Syracuse, N. Y.
THOMAS J. HARRIS, M. D.	New York, N. Y.

HENRY J. HARTZ, M. D.....Detroit, Mich.
WILLIAM H. HASKIN, M. D.....New York, N. Y.
HILL HASTINGS, M. D.....Los Angeles, Cal.
HALSTEAD S. HEDGES, M. D.....Charlotteville, Va.
CHRISTIAN R. HOLMES, M. D.....Cincinnati, O.
EDGAR M. HOLMES, M. D.....Boston, Mass.
JOHN HORN, M. D.....New York, N. Y.
LESTER MEAD HUBBY, M. D.....New York, N. Y.
LEE M. HURD, M. D.....New York, N. Y.
FRANK HYATT, M. D.....Washington, D. C.
E. FLETCHER INGALS, M. D.....Chicago, Ill.
CHEVALIER JACKSON, M. D.....Pittsburg, Pa.
J. W. JERVEY, M. D.....Greenville, S. C.
RICHARD HALL JOHNSTON, M. D.....Baltimore, Md.
JOS. A. KENEFICK, M. D.....New York, N. Y.
PHILIP D. KERRISON, M. D.....New York, N. Y.
FRANK E. KITTREDGE, M. D.....Nashua, N. H.
SAMUEL J. KOPETZKY, M. D.....New York, N. Y.
D. A. KUYK, M. D.....Richmond, Va.
JOHN J. KYLE, M. D.....Los Angeles, Cal.
M. D. LEDERMAN, M. D.....New York, N. Y.
GEORGE A. LELAND, M. D.....Boston, Mass.
JOHN C. LESTER, M. D.....New York, N. Y.
EUGENE R. LEWIS, M. D.....Dubuque, Iowa.
LORENZO B. LOCKARD, M. D.....Denver, Col.
HANAU W. LOEB, M. D.....St. Louis, Mo.
JAMES E. LOGAN, M. D.....Kansas City, Mo.
STEPHEN H. LUTZ, M. D.....Brooklyn, N. Y.
ROBERT CLYDE LYNCH, M. D.....New Orleans, La.
JOHN S. MABON, M. D.....Allegheny, Pa.
JOHN EDMUND MacKENTY, M. D.....New York, N. Y.
GEORGE PAULL MARQUIS, M. D.....Chicago, Ill.
WILLIAM BEVERLY MASON, M. D.....Washington, D. C.
JUSTUS MATTHEWS, M. D.....Rochester, Minn.
CLIFTON M. MILLER, M. D.....Richmond, Va.
HARRIS P. MOSHER, M. D.....Boston, Mass.
ROBERT E. MOSS, M. D.....San Antonio, Tex.
JOHN W. MURPHY, M. D.....Cincinnati, O.
GILBERT D. MURRAY, M. D.....Scranton, Pa.
HARRY L. MYERS, M. D.....Norfolk, Va.
ROBERT C. MYLES, M. D.....New York, N. Y.
JAMES F. McCAW, M. D.....Watertown, N. Y.
O. A. M. McKIMMIE, M. D.....Washington, D. C.
JOHN O. McREYNOLDS, M. D.....Dallas, Tex.
FRANCIS R. PACKARD, M. D.....Philadelphia, Pa.
JOHN R. PAGE, M. D.....New York, N. Y.
WENDELL C. PHILLIPS, M. D.....New York, N. Y.
NORVAL H. PIERCE, M. D.....Chicago, Ill.
J. M. RAY, M. D.....Louisville, Ky.
ANDREW J. N. REIK, M. D.....Baltimore, Md.
W. SCOTT RENNER, M. D.....Buffalo, N. Y.
GEORGE L. RICHARDS, M. D.....Fall River, Mass.
JOHN D. RICHARDS, M. D.....New York, N. Y.
CHARLES W. RICHARDSON, M. D.....Washington, D. C.
JOHN A. ROBINSON, M. D.....New York, N. Y.
JOHN O. ROE, M. D.....Rochester, N. Y.
SYLVAN ROSENHEIM, M. D.....Baltimore, Md.
DUNBAR ROY, M. D.....Atlanta, Ga.
C. C. SANDLES, M. D.....Pittsburg, Pa.
WILLIAM E. SAUER, M. D.....St. Louis, Mo.
B. R. SHURLEY, M. D.....Detroit, Mich.
ROSS HALL SKILLERN, M. D.....Philadelphia, Pa.

GREENFIELD, SLUDER, M. D.....St. Louis, Mo.
A. JOHN SMITH, M. D.....Yonkers, N. Y.
HARMON SMITH, M. D.....New York, N. Y.
S. MacCUEN SMITH, M. D.....Philadelphia, Pa.
E. TERRY SMITH, M. D.....Hartford, Conn.
HERBERT E. SMYTH, M. D.....Bridgeport, Conn.
FREDERICK N. SPERRY, M. D.....New Haven, Conn.
CHARLES N. SPRATT, M. D.....Minneapolis, Minn.
OTTO JACOB STEIN, M. D.....Chicago, Ill.
GEORGE C. STOUT, M. D.....Philadelphia, Pa.
J. A. STUCKY, M. D.....Lexington, Ky.
C. A. THIGPEN, M. D.....Montgomery, Ala.
EUGENE L. VANSANT, M. D.....Philadelphia, Pa.
HENRY L. WAGNER, M. D.....San Francisco, Cal.
GEORGE A. WEBSTER, M. D.....Boston, Mass.
WALTER A. WELLS, M. D.....Washington, D. C.
JOSEPH A. WHITE, M. D.....Richmond, Va.
JOHN R. WINSLOW, M. D.....Baltimore, Md.
D. J. GIBB WISHART, M. D.....Toronto, Canada.
GEORGE B. WOOD, M. D.....Philadelphia, Pa.
JOHN F. WOODWARD, M. D.....Norfolk, Va.
THOMAS CHEW WORTHINGTON, M. D.....Baltimore, Md.

REPORTS OF SECTION MEETINGS.

Report of Eastern Section.

To the American Laryngological, Rhinological and Otological Society, Thomas J. Harris, M. D., Secretary.

DEAR GENTLEMEN:—

I have the honor to report that the meeting of the Eastern Section of the American Laryngological, Rhinological and Otological Society was held in Philadelphia on February 22, 1913, Dr. George C. Stout, Chairman, in the chair.

There were present twenty-eight members of the Society, and twelve gentlemen engaged in the practice of our specialty but not members of the Society.

The meetings were held at the Bellevue-Stratford Hotel, and the following program was carried out:

1. "Exhibition of a Case of Laryngeal Neoplasm," by Dr. Francis R. Packard of Philadelphia, Pa.

2. "A Few Accessory Instruments for Bronchoscopy and Esophagoscopy," by Dr. Chevalier Jackson of Pittsburg, Pa.

3. "A Case of Sinus Thrombosis Complicating Middle Ear Suppuration, with Unusual Symptoms," by Dr. Edward B. Dench of New York, N. Y.

4. "Exhibition of Otitic Brain Abscess," by Dr. S. MacCuen Smith of Philadelphia, Pa.

5. "Brief Report of a Case in which False Teeth Were Removed from the Esophagus After Being in Situ Eighteen Years," by Dr. D. Braden Kyle of Philadelphia, Pa.

6. "A Demonstration of the Intranasal Operation on the Lachrymal Apparatus," by Dr. Sidney Yankauer of New York, N. Y.

7. "A Report of Three Unusual Cases of Stammering," by Dr. G. Hudson-Makuen of Philadelphia, Pa.

8. "Pneumococcus Infection of the Nose and Throat," by Dr. Clement Theisen of Albany, N. Y.

9. "Nasal Hemorrhage Following Turbinectomy in a Hemophiliac Treated by the Injection of Human Blood Serum," by Dr. Linn Emerson of Orange, N. J.

10. "Several Selected Cases in a Rhino-Laryngological Practice," by Dr. John F. Culp of Harrisburg, Pa.

Dr. Clement Theisen was unavoidably detained at the last moment, and was unable to present his paper in person.

The Chair was re-enforced by the presence of the President of the Society, who was more than welcome.

The papers were received with much interest, the discussions were free and general, and the tension high throughout the entire proceedings.

The Chairman wishes to express his thanks to the members present for their earnest and active interest which made this meeting so successful.

Respectfully submitted,

GEORGE C. STOUT,

Chairman Eastern Section.

Report of the Middle Section.

The meeting of the Middle Section of the American Laryngological, Rhinological and Otological Section was held at the University Club in St. Louis, February 22, 1913.

There were fourteen members and about thirty of the local profession in attendance. The Chairman called the Society to order at 10.30 A. M., and after a brief address of welcome the following papers were read and discussed:

1. "Labyrinthitis," by Dr. William L. Ballenger, Chicago, Ill.

2. "Removal of Adenoids by Direct Inspection," by Dr. Joseph C. Beck, Chicago, Ill.

3. "A Demonstration of the Struyken Monochord for the Upper Tone Limit of Hearing," by Dr. M. A. Goldstein, St. Louis, Mo.

4. "Exhibition of Drawings of Anatomical Specimens," by Dr. Hanau W. Loeb, St. Louis, Mo.

On motion, the Section adjourned until 2 P. M.

At the afternoon session, the following cases were presented:

Dr. Bardenheier presented a case of "Blindness Due to Post Ethmoidal Suppuration, Cured by Operation."

Dr. H. W. Loeb presented a case of "Localized Labyrinthitis with Involvement of the Facial."

Drs. L. H. Behrens and W. E. Sauer reported and presented a "Hypophyseal Tumor Case with Acromegaly," showing a very marked improvement in vision and general symptoms, following the Endo-nasal operation of Hirsch.

Dr. H. W. Loeb demonstrated his method of treating "Hysterical Aphonia."

After a discussion of these cases, the following papers were read and discussed:

5. "Some Attempts at the Intranasal Transplantation of Nasal Tissues." (Preliminary report.) By Dr. Samuel Iglauer, Cincinnati, Ohio.

6. "The Differential Diagnosis Between Vincent's Angina and Primary Syphilitic Lesion of the Tonsil," by Dr. Robert Levy, Denver, Colo.

7. "Diaphragmatic Closure of the Esophagus," by Dr. Otto J. Stein, Chicago, Ill.

8. "A Method for Medicating the Deeper Recesses of the Nose and Ear," by Dr. Frank L. Stillman, Columbus, Ohio.

9. "An Unusual Case of Multiple Papilloma of the Larynx Necessitating Tracheotomy and Thyrotomy," by Dr. J. A. Stucky, Lexington, Ky.

By special request Dr. Sluder demonstrated his method of injecting the sphenopalatine ganglion.

The Society then adjourned to meet at the St. Louis Club, where a dinner was given to the visiting members by the local Fellows.

The evening was given to the St. Louis Medical Society, which had invited the Section to furnish the scientific program for their regular meeting.

Dr. J. A. Stucky addressed the Society on the "Relation of the Specialist to the General Practitioner."

Dr. Barnhill: "When and How to Cure Certain Aural Affections."

Dr. Levy read a paper on "Laryngeal Tuberculosis."

These subjects were fully discussed by the members of the Society, as well as by the local profession.

In conclusion I wish to thank the members present for their hearty co-operation.

Respectfully submitted,

W. E. SAUER,

Chairman Middle Section.

Report of the Western Section.

The Western Section of the American Laryngological, Rhinological and Otological Society met with the California State Medical Society, April 15th and 16th, in Oakland, California.

There are ten members of our Society practicing on the Pacific Coast,—seven of the members were present and took an active part in the proceedings. The other members of the Eye and Ear Section of the State Society were invited to participate in the proceedings. The attendance was good, from twenty-five to fifty present at the Section meetings.

Following the meetings operative clinics were held in San Francisco. Interesting clinics were held at the Medical Department of Stanford University and the Medical Department of the University of California,—a radical mastoid, several tonsil operations, a demonstration of hanging laryngoscopy and several interesting internal ear cases.

At the German Hospital, two radical mastoids and several tonsil operations were done. At St. Mary's Hospital an interesting sarcoma of the naso-pharynx and a radical mastoid were shown.

Respectfully submitted,

HILL HASTINGS,

Chairman Western Section.

Report of Southern Section.

The Meeting of the Southern Section was held in Greenville on March 8, with an attendance of about thirty-five. There was a program of twelve papers, but four or five of these were omitted on account of the absence of the readers. A number of members from other Sections honored us with their presence, and the presence of the President, Dr. H. Holbrook Curtis, added much to the enjoyment and success of the meeting. The scientific program was pronounced excellent, and the program of social events apppeared to be enthusiastically enjoyed.

Respectfully submitted,

J. W. JERVEY,

Chairman Southern Section.

EXECUTIVE SESSION.

Thursday, May 8, 1913, 12.30 P. M.

Election of Fellows:

William J. Abbott, Cleveland, Ohio.
Lawrence Dade Alexander, New York, N. Y.
Joseph B. Greene, Asheville, N. C.
Joshua A. Ellegood, Wilmington, Delaware.
Eugene R. Lewis, Dubuque, Iowa.
Robert C. Lynch, New Orleans, La.
Frank R. Spencer, Boulder, Colo.
John Horn, New York, N. Y.
George Paull Marquis, Chicago, Ill.

Appointing of Committees.

Auditing Committee—John F. Barnhill, Indianapolis, Ind.; George L. Richards, Fall River, Mass.; John L. Adams, New York, N. Y.

Nominating Committee—Wendell C. Phillips, New York, N. Y; J. A. Stucky, Lexington, Ky.; Henry L. Wagner, San Francisco, Cal.; Christian R. Holmes, Cincinnati, O.; James E. Logan, Kansas City, Mo.

Friday, May 9, 1913, 9 A. M.

Report of the Secretary.

The Secretary announces with deep regret that during the past year the Society has lost by death three Fellows, Dr. Irving E. Kimball, of Portland, Me., Dr. William F. Dudley, of Brooklyn, and Dr. Patrick F. Gildea, of Colorado Springs.

Dr. Irving E. Kimball, who died on the 4th of August, after an illness of a number of months, was 61 years old. He had practiced his specialty in Portland for many years, and attained a high position in the profession through his skill and learning. He joined this Society in 1896, and was a regular and valued attendant on its meetings.

Dr. William F. Dudley died on the 28th of October, 1912, from septicæmia. Dr. Dudley joined the Society in 1900. One of his

associates in Brooklyn writes of him that "he was one of the most lovable men we had—all of us here in Brooklyn miss him very much."

Dr. Patrick F. Gildea died in California, March 6th, of the present year. He was born in Worcester, Mass., February 15th, 1865, and graduated from the College of Physicians and Surgeons, New York, in 1889. He was House Surgeon at St. Vincent's Hospital, and studied his specialty in London, Paris and Vienna. He had resided for the whole of his professional life in Colorado. He was Vice-President, Chairman of the Western Section, in 1903. He took a leading position in his profession in the west, and as was stated at the time of his death, was full of those qualities that mark a friend and adorn a Christian.

The Society is decidedly the poorer for the loss of such valuable lives.

There has been one resignation during the past year. With the men elected at this meeting, the total membership of the Society is 265, and the honorary Fellows, 25.

The reports of the several Section Meetings have already been made by their Chairmen. We wish to call attention especially to the remarkably successful meeting of the Southern Section held at Greenville, S. C., under the chairmanship of Dr. J. W. Jervey. The Secretary feels that public mention should be made, too, of the valuable work Dr. Jervey has done in bringing in new members. Since his meeting no less than nine applications of desirable men living in the south, have been received from him.

The Transactions this year appeared somewhat late. It is due the Publication Committee to say that this was in no way their fault. The difficulty of obtaining cuts of the articles to be printed was alone accountable for this. The Council at its midwinter meeting took steps to prevent a repetition of this in the future and it is hoped that this year the Transactions will appear promptly in the fall. The thanks of the Society are due the Publication Committee, and especially Dr. Richards for his untiring labor.

It will be noted that the current volume of the Transactions contains an index of the several volumes from 1908 to 1912 inclusive. This was prepared by a Fellow of the Society, Dr. William H. Haskin, whom the best thanks of the Society is due

The Secretary regrets to announce that during the year no thesis in competition for the several prizes held by the Society has been presented.

There have been two meetings of the Council, the Mid-winter meeting in New York, January 4th, and in Washington, May 7th. During the past year approximately 722 letters have been sent out from the Secretary's office.

(Signed) THOS. J. HARRIS, Secretary.

Moved and seconded that the report of the Secretary be accepted as read. Carried.

Report of the Treasurer.

Ewing W. Day, Treasurer, in account with the American Laryngological and Otological Society.

Receipts.

Cash on hand June 1st, 1912		$590.23
To Current Dues, Back Dues and Initiations	$2,520.15	
To Transactions	40.60	
To International Otological Society, (Dr. Hudson Makuen)	5.00	
		$2,565.75
Total		$3,155.98

Disbursements.

Annual Meeting.		
Dr. L. Ingram:		
Reporting Annual Meeting, Traveling Expenses	$110.00	
Abstracting and Copying Discussions	114.10	
Lantern Exhibition	25.00	
Thompson Hall and Lantern Apparatus	60.00	
Handling View Box	2.00	
Expenses of Officers, Clerical Hire, etc.:		
Secretary	274.08	
Treasurer	12.00	
Treasurer's Bond	5.00	
Transactions:		
Dr. G. L. Richards, Expenses and Transactions	12.50	
Dr. Geo. Stout, Eastern Section, Expenses, etc	25.00	
Printing, etc.:		
McBreen & Sons	274.27	
Mercury Publishing Co	1,125.18	
Murdoch Kerr	4.00	
L. D. Alexander, charge on Library Reprints	6.75	
W. H. Haskin	10.00	
1/10 Share Union Switch and Signal Co., (Bought from Sarah Brennan)	12.75	
2/10 Share Union Switch and Signal Co	25.20	
Deposited in Savings Fund	378.01	
Total Expenses		$2,475.84
Receipts year 1912-1913	$3,155.98	
Expenses year 1912-1913	2,475.84	
Balance		$680.14

Audited and found correct.

(Signed) JOHN F. BARNHILL,
(Signed) GEORGE L. RICHARDS,
(Signed) JOHN L. ADAMS.

Report of Librarian.

Year ending May 1913:	
Pamphlets filed	111
Previously	2154
Total	2265

Moved and seconded that the report of the Librarian be received and placed on file. Carried.

Miscellaneous Business.

Dr. Ewing W. Day presented the following resolution:

Resolved that we, the members of the American Laryngological, Rhinological and Otological Society, would welcome the publication, by the American Medical Association, of a high class journal on Laryngology, Rhinology and Otology, on lines similar to those on which the *Journal of Pediatrics* is published.

Moved and seconded that the resolution be adopted. Carried.

The Secretary presented the resignation of Dr. Alva E. Abrams, of Hartford, Conn.

Moved and seconded that the resignation be accepted. Carried.

The Secretary presented a communication from the Council, recommending that Professor Paul Manasse, of Strassburg, Germany, be elected to honorary Fellowship.

It was moved and seconded that the recommendation be approved and that the Secretary cast one ballot for Professor Manasse. Carried.

This was done and Professor Paul Manasse was duly declared an honorary Fellow.

May 9th, 1913, 2.30 P. M.

Report of Committee on Time and Place of Meeting.

The Committee recommended that the next meeting be held the last three days of the first week of June, at Atlantic City.

Moved and seconded that the report of the Committee be received and the recommendation adopted. Carried.

Saturday, May 10th, 1913.

Report of Nominating Committee.

President—Joseph A. White, Richmond, Va.

Vice Presidents—Lewis A. Coffin, New York, Eastern Section; B. R. Shurley, Detroit, Mich., Middle Section; L. B. Lockard, Denver, Colo., Western Section; F. M. Thigpen, Montgomery, Ala., Southern Section.

Members of Council—H. Holbrook Curtis, New York City; J. E. Sheppard, Brooklyn, N. Y.; Robert Levy, Denver, Colo.

Library Committee—H. Holbrook Curtis, New York City; John F. Culp, Harrisburg, Pa.; Joseph A. Kenefick, New York City.

Publication Committee—George L. Richards, Fall River, Mass.; Samuel J. Kopetzky, New York City; F. E. Kittredge, Nashua, N. H.

Secretary—Thomas J. Harris, New York City.

Treasurer—Ewing W. Day, Pittsburg, Pa.

Moved and seconded that the Secretary cast one ballot for the election of officers as read. Carried.

FELLOWS.

Abraham, Jos. H.....130 West 58th St., New York
Abbott, William J.....210 Lennox Bldg., Cleveland, Ohio
Adams, John L.....38 East 51st St., New York
Alderton, Henry A.....142 Clinton St., Brooklyn, N. Y.
Allen, John H.....71 Congress St., Portland, Me.
Alexander, Lawrence Dade..118 Madison Ave., New York, N. Y.
Allport, Frank.....72 E. Madison St., Chicago, Ill.
Ard, F. C.....604 Park Ave., Plainfield, N. J.
Arnold, J. Dennis.....391 Sutter St., San Francisco, Cal.
Arrowsmith, Hubert.....170 Clinton St., Brooklyn, N. Y.
Atkinson, Wm. J.....111 North Main St., Paterson, N. J.
Babbitt, James A.....121 South 18th St., Philadelphia, Pa.
Ballenger, Wm. L.....100 State St., Chicago, Ill.
Bane, Wm. C.....Commonwealth Bldg., Denver, Colo.
Barnhill, John F.....Pennway, Indianapolis, Ind.
Barnes, Harry A.....213 Beacon St., Boston, Mass.
Beck, Joseph C.....2551 No. Clark St., Chicago, Ill.
Berens, Bernard,.....2041 Chestnut St., Philadelphia, Pa.
Berens, T. Passmore.....35 Park Ave., New York
Birkett, H. S.....252 Mountain St., Montreal, Can.
Blackwell, Hugh Burke.....148 West 58th St., New York
Blake, Clarence John.....226 Marlboro St., Boston, Mass.
Borden, Charles R. C.....484 Beacon St., Boston, Mass.
Braislin, W. C.....556 Washington Ave., Brooklyn, N. Y.
Brown, H. Beattie.....40 E. 41st St., N. Y. City
Brown, John E.....289 E. Town St., Columbus, O.
Brown, J. Price.....28 College St., Toronto, Ont., Can.
Bryant, W. Sohier.....41 East 33rd St., New York
Campbell, Wm. E.....606 Century Bldg., Atlanta, Ga.
Canfield, R. Bishop.....300 S. State, Ann Arbor, Mich.
Carmody, Thomas E.....Metropolitan Bldg., Denver, Colo.
Chamberlin, William B.....1021 Prospect Ave., Cleveland, Ohio
Chambers, Talbot R.....15 Exchange Pl., Jersey City, N. J.
Chappell, Walter F.....7 East 55th St., New York, N. Y.

Cheatham, Wm.....303 West Chestnut St., Louisville, Ky.
Chenery, Wm. E.....222 Huntington Ave., Boston, Mass.
Chisholm, W. Alexander.....62 West 53rd St., New York
Christy, T. Chalmers.....99 N. Hudson Ave., Pasadena, Cal.
Clemens, Jas. B.....15 East 48th St., New York, N. Y.
Cline, L. C.....224 North Meridian St., Indianapolis, Ind.
Coakley, C. G.....53 West 56th St., New York
Coates, Geo. M.....2032 Chestnut St., Philadelphia, Pa.
Cobb, Frederick C.....11 Marlboro St., Boston, Mass.
Cocks, Gerhard H.....137 East 54th St., New York
Coffin, Lewis A.....156 West 58th St., New York
Coggeshall, Henry.....40 East 58th St., New York
Cohen, J. Solis.....1824 Chestnut St., Philadelphia, Pa.
Collins, Burnett.....645 St. Marks Ave., Brooklyn, N. Y.
Corwin, Theodore.....20 Central Ave., Newark, N. J.
Coolidge, A.....613 Beacon St., Boston, Mass.
Cott, Geo. F.....1195 Main St., Buffalo, N. Y.
Cox, Chas. N.....257 Jefferson Ave., Brooklyn, N. Y.
Craig, Robert H.....510 Sherbrooke St., West Montreal, Can.
Crockett, Eugene A.....298 Marlboro St., Boston, Mass.
Culbert, Wm. Ledlie.....16 East 54th St., New York
Culp, John F.....211 Locust St., Harrisburg, Pa.
Curtis, H. Holbrook.....118 Madison Ave., New York
Dabney, Wm. R.....282 Front St., Marietta, Ohio
Daly, Walter S.....Ogdensburg, N. Y.
Davis, George Edwin.....50 West 37th St., New York
Day, Ewing W.....Westinghouse Bldg., Pittsburg, Pa.
Dench, Edward B.....15 East 53rd St., New York
Dudley, Wm. F.....32 Livingston St., Brooklyn, N. Y.
Duel, Arthur B.....27 East 57th St. New York
Dunn, John.....314 East Franklin St., Richmond, Va.
Dye, Hobart S.....1404 L. St., N. W., Washington, D. C.
Eagleton, Wells P.....15 Lombardy St., Newark, N. J.
Ellegood, Joshua A.....408 Equitable Bldg., Wilmington, Del.
Ellis, H. Bert.....245 Bradbury Bldg., Los Angeles, Cal.
Emerson, Francis P.....484 Beacon St., Boston, Mass.
Emerson, Linn.....234 Main St., Orange, N. J.
Farrell, Thomas H.....236 Genessee St., Utica, N. Y.
Fetterolf, Geo.....328 South 15th St., Philadelphia, Pa.
Fisher, Mark O.....Union Trust Bldg., Parkersburg, West Va.
Fitzpatrick, T. V.....26 Garfield Place, Cincinnati, Ohio

Fleming, Ernest W....Trust & Savings Bldgs., Los Angeles, Cal.
Forsyth, Edgar A.....322 Franklin St., Buffalo, N. Y.
Foster, John M.....11 Stedman Bldg, Denver, Colo.
Fowler, Edmund P.....616 Madison Ave., New York
Freudenthal, Wolff.....1003 Madison Ave., New York
Friedenberg, Percy.....60 East 58th St., New York
Friedenwald, Harry.....1029 Madison Ave., Baltimore
Gallaher, Thomas J.....California Bldg., Denver, Colo.
Gibb, Jos. S.....1907 Chestnut St., Philadelphia, Pa.
Goldsmith, Perry G.....84 Carlton St., Toronto, Can.
Goldstein, Max A.....3858 Westminster Place, St. Louis, Mo.
Graef, Charles.....1076 Boston Road, New York
Grayson, Charles P.....251 South 16th St., Philadelphia, Pa.
Greene, D. C., Jr.....12 West Cedar St., Boston, Mass.
Greene, Joseph Berry.....Medical Bldg., Asheville, N. C.
Griffin, E. Harrison.....55 West 47th St., New York
Gruening, Emil.....36 East 57th St., New York
Guntzer, J. H.....61 East 86th St., New York
Halsted, Thomas H.....831 University Block, Syracuse, N. Y.
Harris, Thomas J.....117 East 40th St., New York
Hartz, Henry J. .....27 E. Adams Ave., Detroit, Mich.
Haskin, Wm. H. .....40 E. 41st St., New York
Hastings, Hill.....Trust & Savings Bldgs., Los Angeles, Cal.
Hedges, Halstead S.....Charlotteville, Va.
Held, R. Johnson.....616 Madison Ave., New York
Hinkel, F. W.....581 Delaware Ave., Buffalo, N. Y.
Holmes, Christian R.....8 East 8th St., Cincinnati, Ohio
Holmes, Edgar M.....531 Beacon St., Boston, Mass.
Hopkins, F. E.....25 Harrison Ave., Springfield, Mass.
Hopkins, Wm. F.....803 Sutter St., San Francisco, Cal.
Horn, John.....255 E. Broadway, New York, N. Y.
Hubbard, Thomas.....205 Ontario St., Toledo, Ohio
Hubby, Lester M.....27 West 68th St., New York
Hurd, Lee M.....15 East 48th St., New York
Hyatt, Frank.....The Rochambeau, Washington, D. C.
Iglauer, Samuel.....22 W. 7th St., Cincinnati, Ohio
Ingals, E. Fletcher.....104 Michigan Ave., Chicago, Ill.
Ingersoll, John M.....1021 Prospect Ave., Cleveland, Ohio

Jack, F. L.....215 Beacon St., Boston, Mass.
Jackson, Chevalier.....Westinghouse Bldg., Pittsburg, Pa.
Jackson, Oliver H.....34 North Main St., Fall River, Mass.
Jervey, J. W..1 and 2 Bank & Commerce Bldg., Greenville, S. C.
Joachim, Otto.....501 Macheca Bldg., New Orleans, La.
Johnson, Walter B.....170 Broadway, Paterson, N. J.
Johnston, Richard H.....807 North Charles St., Baltimore, Md.
Jones, Clarence Porter.....118 32nd St., Newport News, Va.
Keiper, Geo. F.....14 No. 6th St., Lafayette, Ind.
Kenefick, Jos. A.....78 E. 54th St., New York
Kennon, Beverly R.....64 Granby St., Norfolk, Va.
Kent, J. L.....811 Church St., Lynchburg, Va.
Kerrison, Philip D.....58 West 56th St., New York
Kirkendall, J. S.....Ithaca, N. Y.
Kittredge, Frank E.....Masonic Temple, Nashua, N. H.
Knowles, W. F.....220 Clarendon St., Boston, Mass.
Kopetzky, Samuel J.....616 Madison Ave., New York
Kuyk, D. A.....506 E. Grace St., Richmond, Va.
Kyle, D. Braden.....1517 Walnut St., Philadelphia, Pa.
Kyle, John J.....The Newton Claypool Bldg., Indianapolis, Ind.
Large, Secord H.....536 Rose Bldg., Cleveland, Ohio
Lasalle, J. J.....226 Michigan St., Toledo, Ohio
Lederman, M. D.....58 East 75th St., New York
Leland, George A.....354 Commonwealth Ave., Boston, Mass.
Lester, John C.....432 Madison Ave., New York
Levy, Robert.....Metropolitan Bldg., Denver, Colo.
Lewis, Robert.....48 West 40th St., New York
Lewis, Eugene R.....1130 Main St., Dubuque, Iowa
Lincoln, Wm. R.....Lenox Bldg., Cleveland, Ohio
Linhart, C. P.....106 East Broad St., Columbus, Ohio
Lockard, Lorenzo B.....Metropolitan Bldg., Denver, Colo.
Loeb, H. W.....537 North Grand Ave., St. Louis, Mo.
Logan, Jas. E.....1208 Wyandotte St., Kansas City, Mo.
Loughran, Robt. Livingston.....62 W. 52nd St., N. Y.
Lowman, John B.....142 Park Place, Johnstown, Pa.
Lutz, Stephen H.....284 Hancock St., Brooklyn, N. Y.
Lynch, Robert Clyde.....New Orleans, La.
Mabon, John S.....721 Sandusky St., Allegheny, Pa.
MacKenty, John Edmund.....43 W. 54th St., New York, N. Y.
Macpherson, D.....467 Manhattan Ave., New York.
Makuen, G. Hudson.....1627 Walnut St., Philadelphia.

Malcolm, Pency E. D.....55 West 55th St., New York.
Marquis, George Paull.....31 No. State St., Chicago, Ill.
Martinez, Emilio.....56 Neptune St., Havana, Cuba.
Mason, Wm. Beverly..812 Connecticut Ave., Washington, D. C.
Matthews, Justus.....123 South Main St., Rochester, Minn.
Means, Chas. S.....715 North High St., Columbus, Ohio.
Mercer, Wm. F.....400 W. Grace St., Richmond, Va.
Mial, Leonidas L.....139 West 12th St., New York.
Miller, Clifton M.....217 E. Grace St., Richmond, Va.
Miller, Frank E.....22 West 31st St., New York.
Milligan, Robert.....Westinghouse Building, Pittsburg, Pa.
Mooney, Jas. J.....393 7th St., Buffalo, N. Y.
Moore, Thomas W.....1048 Third Ave., Huntington, W. Va.
Morgenthau, Geo.....34 Washington St., Chicago, Ill.
Mosher, Harris P.....828 Beacon St., Boston, Mass.
Moss, Robert E.....Hicks Bldg., San Antonio, Tex.
Munger, Carl E.....81 No. Main St., Waterbury, Conn.
Murphy, John W.....4 West 17th St., Cincinnati, Ohio.
Murray, Gilbert D.....436 Wyoming Ave., Scranton, Pa.
Myers, Harry L.....Taylor Bldg., 151 Granby St., Norfolk, Va.
Myles, Robert C.....46 West 38th St., New York.
McCaw, James F.....114 Sterling St., Watertown, N. Y.
McClelland, Lefferts A.....78 McDonough St., Brooklyn, N. Y.
McCoy, John J.....157 West 73rd St., New York.
McCullagh, Samuel.....35 Park Ave., New York.
McKernon, Jas. F.....62 West 52nd St., New York.
McKimmie, O. A. M....1330 Mass. Ave., N. W. Washington, D. C.
McLaury, Frank H.....Westport, Conn.
McReynolds, John O.....Wilson Building, Dallas, Tex.
Off, Henry J.....121 South 18th St., Philadelphia, Pa.
O'Kelley, Jas. P.....501 Macheca Bldg., New Orleans, La.
Oppenheimer, Seymour.....45 East 60th St., New York.
Packard, Francis R.....304 South 19th St., Philadelphia, Pa.
Page, John R.....27 East 57th St., New York, N. Y.
Page, Lafayette.....224 N. Meridian St., Indianapolis, Ind.
Park, J. Walter.....32 North 2d St., Harrisburg, Pa.
Parker, Edward F.....70 Hassell St., Charleston, S. C.
Patterson, Jas. A.....214 Burns Bldg., Colo. Springs, Colo.
Phillips, Wendell C.....40 West 47th St., New York.
Pierce, Norval H.....31 Washington St., Chicago, Ill.
Pischell, Kaspar.....1817 California St., San Francisco, Cal.
Quinlan, F. J.....33 West 38th St., New York.

Rae, John B.....247 West 70th St., New York.
Ray, J. M.....432 West Chestnut St., Louisville, Ky.
Reik, Andrew J. N.....506 Cathedral St., Baltimore, Md.
Reik, Henry O.....506 Cathedral St., Baltimore, Md.
Renner, W. Scott.....341 Linwood Ave., Buffalo, N. Y.
Reuling, Geo.....103 West Monument St., Baltimore, Md.
Richards, George L.....124 Franklin St., Fall River, Mass.
Richards, John D.....8 E. 54th St., New York.
Richardson, Chas. W..1317 Connecticut Ave., Washington, D. C.
Roberts, Walter.....33 South 19th St., Philadelphia, Pa.
Roberts, W. Humes.....461 East Colo. St., Pasadena, Cal.
Robinson, John A.....40 E. 41st St., New York.
Roe, John O.....28 Clinton Ave., N. Rochester, N. Y.
Root, Arthur G.....218 States St., Albany, N. Y.
Rosenheim, Sylvan.....,1710 Linden Ave., Baltimore, Md.
Ross, Geo. T.....623 Dorchester St., West Montreal, Can.
Roy, Dunbar.....Grand Opera House Block, Atlanta, Ga.
Sandles, C. C.....Westinghouse Bldg., Pittsburg, Pa.
Sauer, Wm. E.....Grand and Washington Aves., St. Louis, Mo.
Scarlett, Rufus B.....4009 Chestnut St., Philadelphia, Pa.
Sharp, J. Clarence.....62 West 46th St., New York.
Shattuck, Warren S., Jr.....160 Clinton St., Brooklyn, N. Y.
Sheppard, J. E.....130 Montague St., Brooklyn, N. Y.
Shorter, J. H.....210 The Grand, Macon, Ga.
Shurley, B. R.....32 West Adams Ave., Detroit, Mich.
Skillern, Ross Hall.....2032 Chestnut St., Phila., Pa.
Sluder, Greenfield.....3542 Washington Ave., St. Louis, Mo.
Smith, A. John.....Yonkers, New York.
Smith, Harmon.....44 West 49th St., New York.
Smith, S. MacCuen.....1429 Spruce St., Philadelphia, Pa.
Smith, W. Harvey.....250 Donald St., Winnipeg, Manit.
Smith, E. Terry.....75 Pratt St., Hartford, Conn.
Smyth, Herbert E.....376 John St., Bridgeport, Conn.
Solenberger, Amos R....106 E. St. Vrain St., Colo. Springs, Colo.
Sondern, Paul F.....16 Church St., Montclair, N. J.
Sperry, Frederick N.....33 College St., New Haven, Conn.
Spencer, Frank R.....Boulder, Colo.
Spratt, Chas. N..Reid cor. 9th St. & Nicollet Ave., Minneapolis, Minn.
Steel, Geo. E.....Broadway & 79th St., New York.
Stein, Otto Jacob.....100 State St., Chicago, Ill.
Sterrett, John Kennedy.....320 Smith Block, Pittsburg, Pa.
Stillman, F. L.....118 East Broad St., Columbus, Ohio.

Stout, Geo. C.....1611 Walnut St., Philadelphia, Pa.
Stucky, J. A.....The McClelland Bldg., Lexington, Ky.
Theisen, Clement F.....172 Washington Ave., Albany, N. Y.
Thigpen, C. A.....13 South Ferry St., Montgomery, Ala.
Thigpen, F. M.....13 South Ferry St., Montgomery, Ala.
Thompson, John A.....628 Elm St., Cincinnati, Ohio.
Thompson, J. C.....202 Ninth Ave., Pittsburg, Pa.
Thomson, John J.....40 West 47th St., New York.
Thrasher, A. B.....N. E. Cor. 7th and Race Sts., Cincinnati, Ohio.
Thrasher, Wade....N. E. Cor. 7th and Race Sts., Cincinnati, Ohio.
Trowbridge, D. H.....Forsyth Bldg., Fresno, Cal.
Tunis, Joseph P.....St. Martins, Philadelphia, Pa.
Turnbull, Thomas.....835 Wheaton Ave., Allegheny, Pa.
Tyson, Henry Hawkins.....47 West 51st St., New York.
Vail, Derrick T.....24 East 8th St., Cincinnati, Ohio.
Vansant, Eugene L.....1929 Chestnut St., Philadelphia, Pa.
Voislawsky, A. P.....128 West 59th St., New York.
Wagner, Henry L.....2303 Bush St., San Francisco, Cal.
Wales, Ernest DeW...320 North Meridian St., Indianapolis, Ind.
Waterman, Jas. S.....676 St. Marks Ave., Brooklyn, N. Y.
Webster, Geo. A.....419 Boylston St., Boston, Mass.
Wells, Walter A.....The Rochambeau, Washington, D. C.
White, Joseph A.....200 East Franklin St., Richmond, Va.
Whiting, Frederick.....19 W. 47th St., New York.
Wiener, Alfred.....616 Madison Ave., New York.
Wilson, Norton L.....410 Westminster Ave., Elizabeth, N. J.
Winslow, John R.....The Latrobe Apts., Baltimore, Md.
Wishart, D. J. Gibb.....47 Grosvenor St., Toronto, Can.
Wood, George B.....129 South 18th St., Philadelphia, Pa.
Woodward, John F.....153 Granby St., Norfolk, Va.
Worthington, Thos. C.....1022 Madison Ave., Baltimore, Md.
Yates, D. G.....79 West 104th St., New York.
Yankauer, Sidney.....616 Madison Ave., New York.

HONORARY FELLOWS.

Ballance, C. E.....106 Harley St., London, W., Eng.
Bell, Alex. G.....1336 19th St., Washington, D. C.
Chiari, Ottokar.....Bellariastrasse 12, Vienna, Austria.
Gradenigo, Gius.....Corso Vittorre Emmanuele 44, Turin, Italy.
Grant, Dundas.....18 Cavendish Square, London, W., Eng.
Heryng, T.....Jasna 10, Warsaw, Russia.

Jansen, A.....Hardenbergst 12, Berlin, Germany.
Karwowski, C.....Warsaw, Russia.
Killian, Gustav.....Berlin, Germany.
Law, Edward.....8 Wimpole St., Cavendish Sq., London, Eng.
Love, James Kerr.....650 Shields Road, Pollokshields, Glasgow, Scotland.
Luc, H.....54 Rue de Varenne, Paris.
Macintyre, John.....179 Bath St., Glasgow, Scotland.
Manasse, Paul.....Strassburg, Germany.
Martin, A.....25 Rue de General Foy, Paris.
Moure, E. J.....25 Cours du Jardin Public, Bordeaux, France.
Onodi, Adolph.....o'Uctza 12, Budapesth, Hungary.
Politzer, Adam.....1 Gongazagesse Square, Vienna.
Poyet, George.....15 Rue de Milan, Paris, France.
Semon, Sir Felix.....Rignall, Great Missenden, Bucks, Eng.
Schmieglow, E.....18 Norregade, Copenhagen, Denmark.
Sendziak, J.....Marzaekowska 139, Warsaw, Russia.
Turner, Logan.....27 Walker Street, Edinburgh, Scotland.
Woakes, Edward.....Belvoir House, Fareham, Hants, Eng.
Wolfenden, R., N. 76 Wimple St., Cavendish Sq., London, W., Eng.
Ziem, C. H.....75 San R, Danzig, Germany.

VICE-PRESIDENTS OF THE SOCIETY.

	Eastern Section.	Southern Section.	Middle Section.	Western Section.
1896	Joseph O'Dwyer, M. D.	(Only one Vice-President elected).		
1897	F. L. Jack, M. D.	Wm. Sheppegrell, M. D.	J. S. Mahon, M. D.	J. E. Logan, M. D.
1898	A. G. Root, M. D.	A. W. Calhoun, M. D.	J. A. Thompson, M. D.	J. E. Schadle, M. D.
1899	C. W. Richardson, M. D.	C. A. Thigpen, M. D.	Max Thorner, M. D.	H. L. Wagner, M. D.
1900	G. H. Makuen, M. D.	J. A. Stucky, M. D.	H. S. Straight, M. D.	Robert Levy, M. D.
1901	W. S. Renner, M. D.	J. A. White, M. D.	N. H. Pierce, M. D.	J. O. McReynolds, M. D.
1902	H. H. Curtis, M. D.	C. F. McGahan, M. D.	H. W. Loeb, M. D.	E. W. Fleming, M. D.
1903	F. C. Cobb, M. D.	Dunbar Roy, M. D.	L. C. Cline, M. D.	P. F. Gildea, M. D.
1904	G. L. Richards, M. D.	J. F. Woodward, M. D.	C. Jackson, M. D.	R. W. Payne, M. D.
1905	S. MacCuen Smith, M. D.	Wm. Cheatham, M. D.	Thomas Hubbard, M. D.	M. A. Goldstein, M. D.
1906	T. H. Halsted, M. D.	H. L. Myers, M. D.	W. L. Ballenger, M. D.	H. B. Ellis, M. D.
1907	F. B. Sprague, M. D.	J. M. Ray, M. D.	J. M. Ingersoll, M. D.	W. C. Bane, M. D.
1908	E. A. Crockett, M. D.	H. O. Reik, M. D.	J. F. Barnhill, M. D.	W. H. Roberts, M. D.
1909	F. R. Packard, M. D.	John Dunn, M. D.	R. B. Canfield, M. D.	J. C. Beck, M. D.
1910	J. F. McCaw, M. D.	O. A. M. McKimmie, M. D.	H. J. Hartz, M. D.	A. R. Solenberger, M. D.
1911	H. P. Mosher, M. D.	J. A. Kent, M. D.	La Fayette Page, M. D.	Wm. H. Dudley, M. D.
1912	Theodore Corwin, M. D.	Otto Joachim, M. D.	John A. Thompson, M. D.	Thomas J. Gallaher, M. D.
1913	George C. Stout, M. D.	J. W. Jervey, M. D.	Wm. E. Sauer, M. D.	Hill Hastings, M. D.
1914	Lewis A. Coffin, M. D.	F. M. Thigpen, M. D.	B. R. Shurley, M. D.	Lorenzo B. Lockard, M. D.

SECRETARY AND TREASURER.

1896 to 1900
Robert Cunningham Myles, M.D.
1901 to 1906
Wendell C. Phillips, M. D.
1907 to date
Thomas J. Harris, M. D.

1901 to 1907
Ewing W. Day, M. D.
1908 Chevalier Jackson, M. D.
1909 to date
Ewing W. Day, M. D.

COUNCIL.

1896—T. P. Berens, M. D.
J. H. Billings, M. D.
D. L. Hubbard, M. D.
H. H. Curtis, M. D.
W. C. Phillips, M. D.
R. C. Myles, M. D.
1897—G. H. Makuen, M. D.
T. P. Berens, M. D.
W. C. Phillips, M. D.
H. H. Curtis, M. D.
E. W. Day, M. D.
D. L. Hubbard, M. D.
1898—J. E. Nichols, M. D.
H. H. Curtis, M. D.
L. A. Coffin, M. D.
W. C. Phillips, M. D.
E. W. Day, M. D.
C. W. Richardson, M. D.
S. E. Solly, M. D.
1899—W. H. Daly, M. D.
W. C. Phillips, M. D.
T. H. Halsted, M. D.
J. O. Roe, M. D.
W. H. Loeb, M. D.
T. C. Christy, M. D.
F. L. Jack, M. D.
D. L. Hubbard, M. D.
1900—S. E. Solly, M. D.
W. H. Daly, M. D.
A. W. Calhoun, M. D.
J. B. Clemens, M. D.
J. F. McKernon, M. D.
W. C. Phillips, M. D.
J. E. Sheppard, M. D.
Price Brown, M. D.
Max Thorner, M. D.
1901—D. B. Kyle, M. D.
S. MacCuen Smith, M. D.
S. E. Solly, M. D.
Price Brown, M. D.
W. H. Daly, M. D.
J. B. Clemens, M. D.
J. F. McKernon, M. D.
C. W. Richardson, M. D.
F. C. Cobb, M. D.
1902—D. B. Kyle, M. D.
S. E. Solly, M. D.
J. F. McKernon, M. D.
S. MacCuen Smith, M. D.
F. C. Cobb, M. D.
N. H. Pierce, M. D.
T. P. Berens, M. D.
J. A. White, M. D.
1903—C. W. Richardson, M. D.
R. C. Myles, M. D.
D. B. Kyle, M. D.
J. F. McKernon, M. D.
S. MacCuen Smith, M. D.
F. C. Cobb, M. D.
N. H. Pierce, M. D.
T. P. Berens, M. D.
C. R. Holmes, M. D.
1904—J. A. Stucky, M. D.
C. W. Richardson, M. D.
R. C. Myles, M. D.
A. G. Root, M. D.
T. P. Berens, M. D.
C. R. Holmes, M. D.
E. B. Dench, M. D.
F. L. Jack, M. D.
J. E. Schadle, M. D.
F. R. Packard, M. D.
1905—N. H. Pierce, M. D.
J. A. Stucky, M. D.
C. W. Richardson, M. D.
L. A. Coffin, M. D.
T. H. Halsted, M. D.
C. R. Holmes, M. D.
E. B. Dench, M. D.
F. L. Jack, M. D.

J. E. Schadle, M. D.
F. R. Packard, M. D.
1906 —F. C. Cobb, M. D.
N. H. Pierce, M. D.
J. A. Stucky, M. D.
E. B. Dench, M. D.
F. L. Jack, M. D.
F. R. Packard, M. D.
L. A. Coffin, M. D.
T. H. Halsted, M. D.
J. F. McKernon, M. D.
H. W. Loeb, M. D.
1907—J. E. Logan, M. D.
F. C. Cobb, M. D.
N. H. Pierce, M. D.
L. A. Coffin, M. D.
T. H. Halsted, M. D.
J. F. McKernon, M. D.
H. W. Loeb, M. D.
C. W. Richardson, M. D.
D. B. Kyle, M. D.
1908—W. C. Phillips, M. D.
J. E. Logan, M. D.
F. C. Cobb, M. D.
J. F. McKernon, M. D.
H. W. Loeb, M. D.
C. W. Richardson, M. D.
D. B. Kyle, M. D.
C. R. Holmes, M. D.
J. F. McCaw, M. D.
1909 —J. E. Logan, M. D.
D. B. Kyle, M. D.
C. W. Richardson, M. D.
W. C. Phillips, M. D.
J. F. McCaw, M. D.
W. R. Lincoln, M. D.
G. L. Richards, M. D.
J. F. Barnhill, M. D.
G. H. Makuen, M. D.
1910—C. R. Holmes, M. D.
G. L. Richards, M. D.
J. F. Barnhill, M. D.
G. H. Makuen, M. D.
N. H. Pierce, M. D.
W. C. Phillips, M. D.
A. B. Duel, M. D.
F. R. Packard, M. D.
Robert Levy, M. D.
1911—J. F. McKernon, M. D.
J. A. White, M. D.
N. L. Wilson, M. D.
C. R. Holmes, M. D.
F. R. Packard, M. D.
A. B. Duel, M. D.
Robert Levy, M. D.
G. L. Richards, M. D.
N. H. Pierce, M. D.
1912—C. R. Holmes, M. D.
F. R. Packard, M. D.
N. H. Pierce, M. D.
J. F. McKernon, M. D.
J. A. White, M. D.
N. L. Wilson, M. D.
C. Jackson, M. D.
M. A. Goldstein, M. D.
A. B. Duel, M. D.
1913—James F. McKernon, M .D.
Joseph A. White, M. D.
Norton L. Wilson, M. D.
Chevalier Jackson, M. D.
Max A. Goldstein, M. D.
Arthur B. Duel, M. D.
Harris P. Mosher, M. D.
E. Fletcher Ingals, M. D.
G. Hudson-Makuen, M. D.
1914—Chevalier Jackson, M. D.
Max A. Goldstein, M. D.
Arthur B. Duel, M. D.
Harris P. Mosher, M. D.
E. Fletcher Ingals, M. D.
G. Hudson Makuen, M. D.
H. Holbrook Curtis, M. D.
John E. Sheppard, M. D.
Robert Levy, M. D.

DECEASED WHILE MEMBERS OF THE SOCIETY.

Resident Members.

Noyes, J. I., M. D.....1896
O'Dwyer, Joseph, M. D.....1897
Hengst, D. A., M. D.....1898
Nichols, J. E. H., M. D.....1898
Hopkins, Woolsey, M. D....1899
Rankin, D., M. D.....1900
Wenner, R. J., M. D.....1900
Chapman, S. Hartwell, M. D. 1903
Friedenberg, Edward, M. D..1903
Kibbe, A. B., M. D.....1903
Hoople, H. Nelson, M. D....1905
Brandegee, Wm. P., M. D...1906
Solly, S. E., M. D.....1906
Harland, W. G. B., M. D....1907
Burnett, Peter V., M. D....1908
Roosa, D. B., St. John, M. D.1908
Schadle, J. E., M. D.....1908
Pette, C. H., M. D.....
Sprague, F. B., M. D.....1909
Mullins, John B., M. D.....1909
McGahan, C. F., M. D.....1910
Anderson, Willis S., M. D....1910
Calhoun, A. W., M. D.....1910
Gradle, Henry, M. D.....1911
Koyle, F. H., M. D.....1911
Kimball, Irving E., M. D....1913
Dudley, William F., M. D....1912
Gildea, Patrick F., M. D....1913

HONORARY MEMBERS WHO HAVE DIED.

Whistler, W. McNeill.....1899
Gougenheim, Achille.....1901
Gruber, Joseph.....1901
Brown, Lennox.....1902
Smyly, Sir Philip.....1904
Joal, Joseph.....

RF
1
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1913
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Rhinological and Otological
Society
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